

Rock Products

TRADEPRESS PUBLISHING CORPORATION
542 SOUTH DEARBORN STREET
CHICAGO

NATHAN C. ROCKWOOD, Editor

CHAS. H. FULLER, Manager

C. F. TREFZ, Associate Editor

Vol. XXIII, No. 3

January 31, 1920

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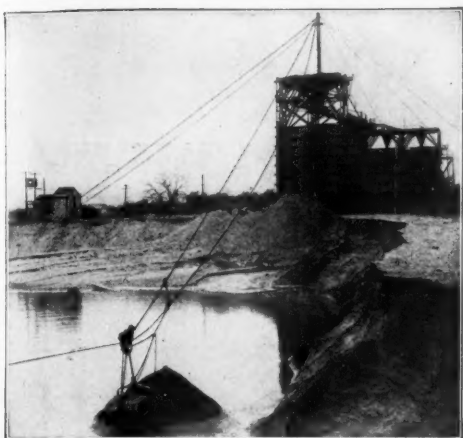
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Are You Ready to Do Your Part to Make This the Record Year in Gravel Production?

In order to dismay the prophets who predict sand and gravel production in 1920 will not begin to meet the demand, each producer should get ready early to anticipate the requirements for aggregate for road work and concrete construction in his territory.

Many producers are already preparing by installing Sauerman dragline cableway excavators, either for increasing the capacity of their old plants or for opening up new pits.

They know that greatest output at least expense for machinery, labor and upkeep is assured by employing a type of excavator that not only digs the gravel but also conveys it to the plant and elevates it to the screens or bins in one continuous operation.

So it is a certainty that Sauerman dragline cableway excavators will play a predominant part in making 1920 a record year in the production of sand and gravel in the United States.

By increasing our manufacturing facilities, we have so far been able to take care of all orders for our equipment with reasonable promptness.

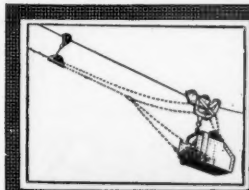
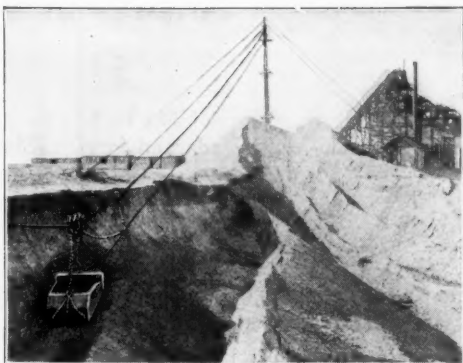
However, at this season of the year, it is always wise for the prospective purchaser of gravel plant equipment to place his order as early as possible, and such is particularly true this year.

If you attend the convention of the National Sand and Gravel Producers' Association in Chicago, February 11 and 12, that will be an opportune time to put your problems before our engineers. Our new catalog is yours for the asking.

SAUERMAN BROS.

1140 Monadnock Block

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SAUERMAN

DRAGLINE CABLEWAY EXCAVATORS

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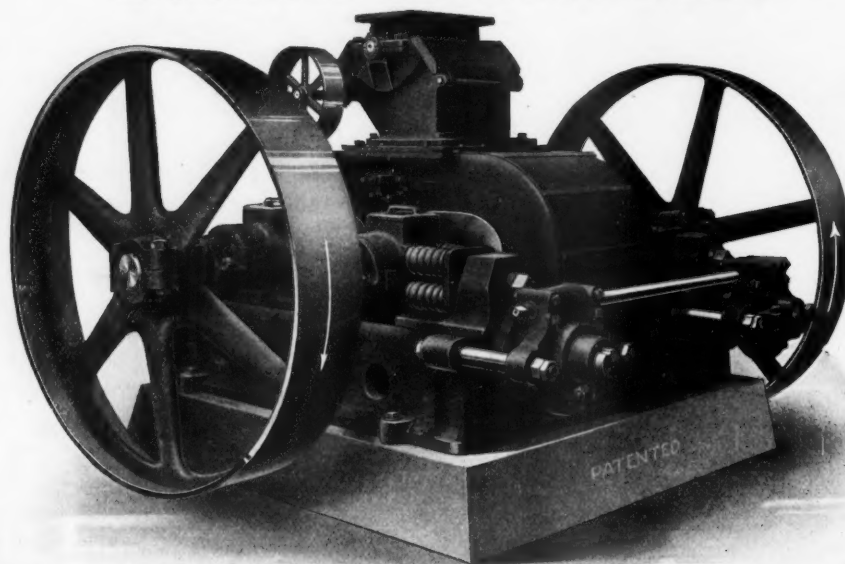


"ONE MAN - ONE MINUTE"



STURTEVANT "OPEN-DOOR" MACHINERY

BALANCED CRUSHING ROLLS



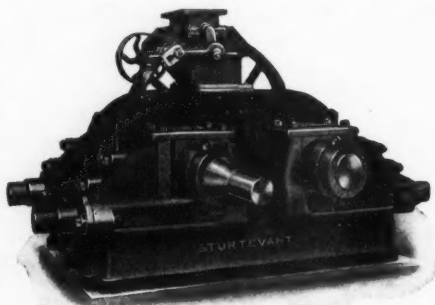
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CRUSHING SHOCKS QUARTERED

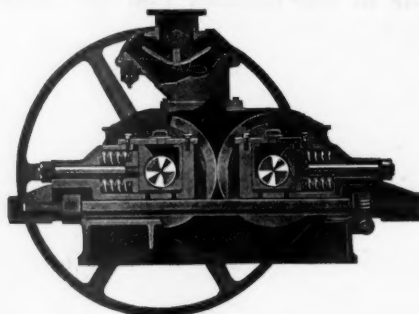
Because the springs back of all four bearings allow the rolls to spring back in relief, equally and oppositely, thus balancing each other and **QUARTERING** the usual crushing shocks common to such machines.

Automatic adjustments, while operating—No shims—Great, strong, massive machines, built to withstand hardest usage, such as crushing of Ores, Emery, Alundum, Corundum, and other hard abrasives.

Sizes: 8x5, 12x12, 16x10, 20x14, 22x14, 26x15, 30x16, 32x16, 36x20, 38x20.



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HARRISON SQUARE

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Hose That is Part of the Tool

A light, strong hose built specially for pneumatic tool work, Goodyear Monterey Air Hose handles easily and stands a lot of grief.

The riveter values the flexibility that gives it full play in awkward places, and the lightness that puts no tax on his own strength. He knows from the steady action of the hammer that the stout-bodied Goodyear Monterey hose is giving the tool the full benefit of the air pressure.

The hard usage that hose gets on all construction work, tools dropping on it, sharp projections scoring it, is met by

Goodyear Monterey Air Hose, with a staunch resistance to abrasion.

And it holds the pulsating pressure with a sure strength that guarantees against kinks, cracks or bursts.

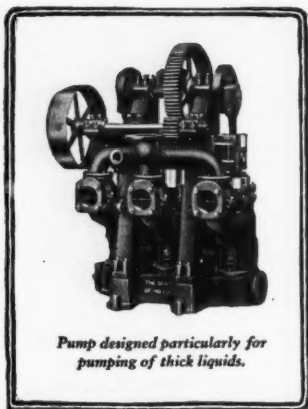
Oil-resistant, Goodyear Monterey Air Hose withstands the action of any oil that may work through from the condenser.

Specified to the duty required of it, Goodyear Monterey Air Hose works with the economy of a tool part, fits into an important place in the production line, and outwears ordinary air hose by a wide margin of dependable, efficient service.

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Offices Throughout the World

BELTING · PACKING  HOSE · VALVES
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Pump designed particularly for pumping of thick liquids.

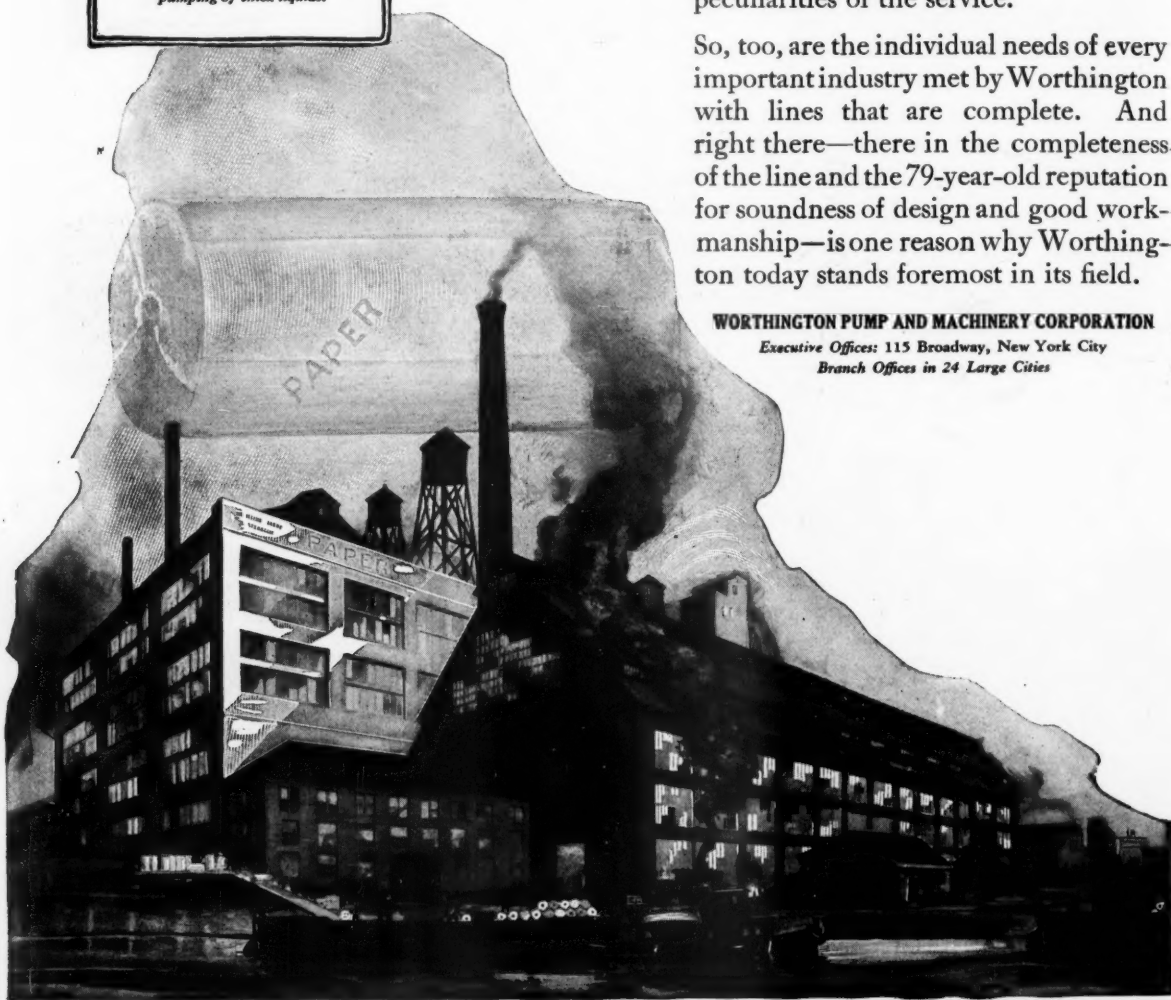
The peculiar pump for paper pulp— an example of Worthington thoroughness

PUMPING thick pulp—a task for an unusual pump. Yet it is characteristic of the thoroughness of Worthington that this company meets not only this, but every other hydraulic need of the paper industry, with equipment which takes into account all the peculiarities of the service.

So, too, are the individual needs of every important industry met by Worthington with lines that are complete. And right there—there in the completeness of the line and the 79-year-old reputation for soundness of design and good workmanship—is one reason why Worthington today stands foremost in its field.

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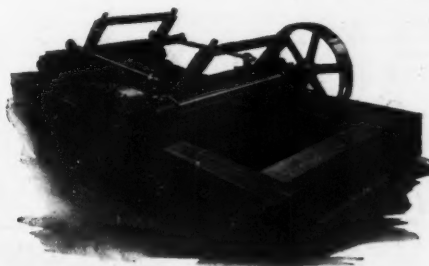
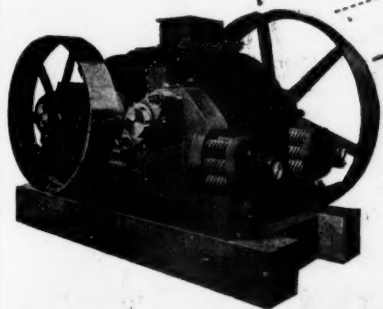
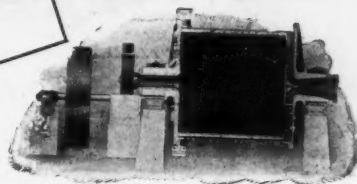
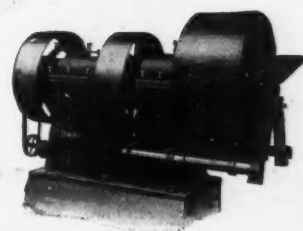
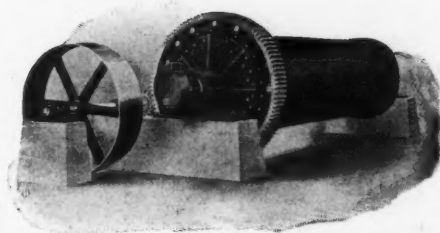
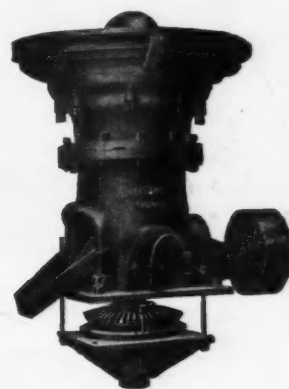
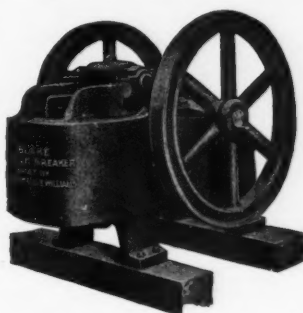
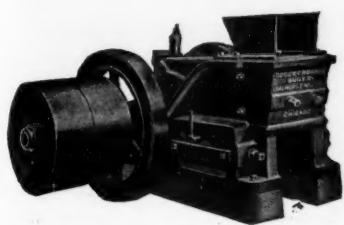
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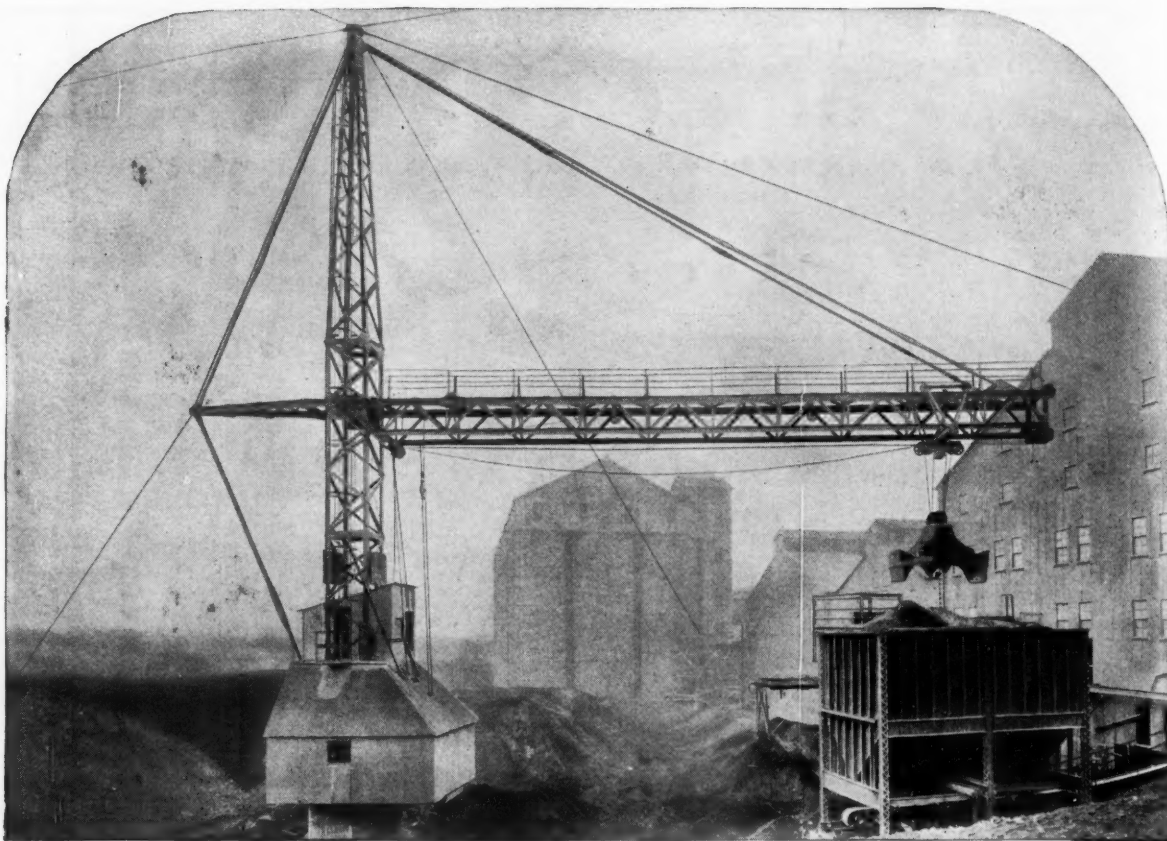
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CHALMERS & WILLIAMS
1425 Arnold Street
Chicago Heights, Illinois

We desire to crush.....tons
at the rate of.....
per hour.

The size of feed will be.....
The size of product desired is.....
Quote price and delivery on suit-
able machine.
Sign here.

Address.....
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Cold Figures—No Guesswork—Prove "American" Hoist Efficiency

Reserve power and strength are the big characteristics of "AMERICAN" machines. Most owners of "AMERICAN" Hoisting Machinery never work their machines up to capacity—they don't know how strong they really are. But now and then an "AMERICAN" owner finds himself up against a heavier job than usual. Will the "AMERICAN" do it? Unless it will, he is sure to be put to much extra expense and bother. And unless the load is out of all reason, the "AMERICAN" fully meets the situation.

The Pacific Portland Cement Company had the great reserve power of "AMERICAN" equipment demonstrated to them in a most convincing manner. They bought an "AMERICAN" steel storage crane to replace

a conveyor system for handling limestone and limestone-clinker. This big crane is the "king-pin" of their whole plant and they wanted to be sure that it had reserve power enough to take care of possible expansion.

Testing instruments were installed and it was found that only 74% of the available strength of the motor was being used. It had 26% in reserve for the "rainy day," the time when it would be pushed.

There is always a little more than what you pay for in "AMERICAN" equipment.

No matter where you are, an "AMERICAN" representative can reach you in twenty-four hours.

"Give me where I may stand and I will move the world"

American Hoist & Derrick Co.

55 South Robert Street

Saint Paul

Minnesota

Builders of "AMERICAN"

Hoisting Engines
Electric Hoists
Derricks

Locomotive Cranes
Railroad Ditchers
Logging Equipment

Sugar Cane Machinery
Marine Deck Machinery and Tackle
The Genuine "CROSBY" Wire Rope Clip

New York

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AMERICAN

HOIST & DERRICK CO.



The Bradley Hercules Mill

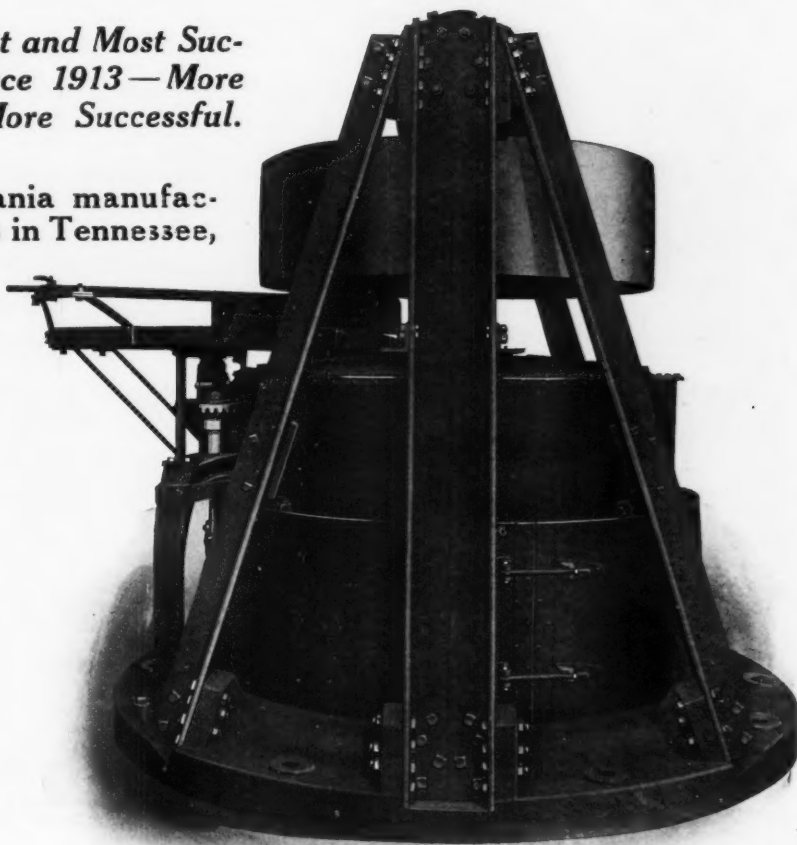
Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913—More Popular than Ever and More Successful.

13 mills sold to Pennsylvania manufacturers. Other installations in Tennessee, New York, North Carolina, Illinois, Oklahoma, California, Washington, Cuba, Argentine.

It's the largest preliminary machine manufactured adapted for pulverizing cement rock, limestone or clinker.

One manufacturer with two mills, ground 170,000 barrels clinker in one month—an other manufacturer has averaged 40 tons per hour, when grinding limestone over a period of several years of operation.



It's a Wonderful Labor and Power Saver

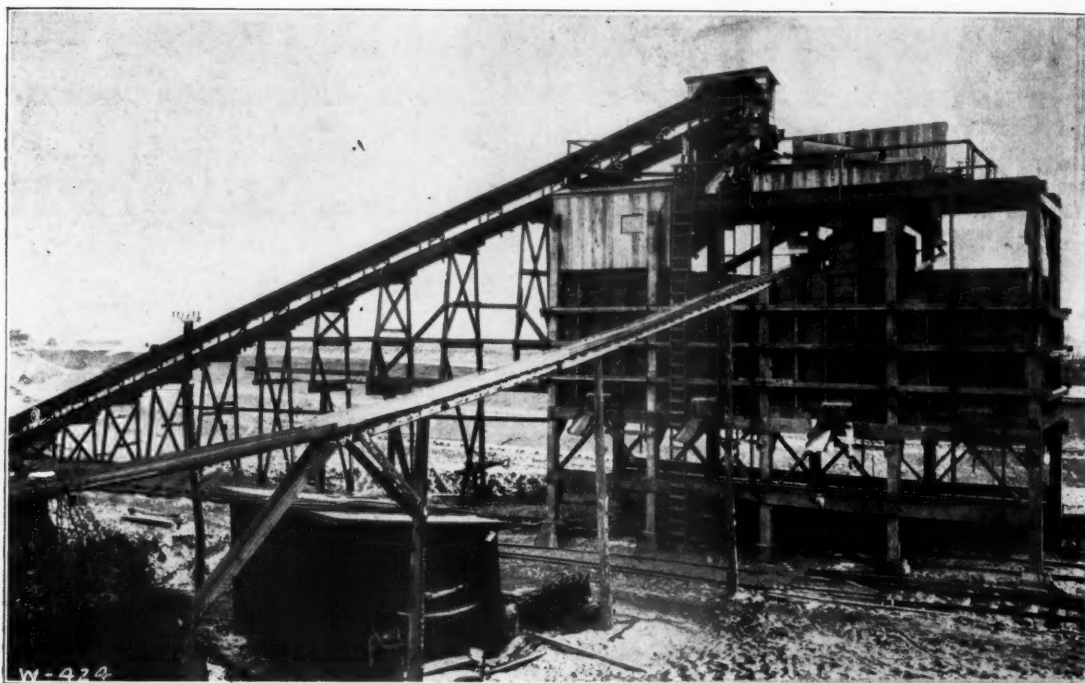
Our Engineers will gladly show you how this mill will reduce your present operating costs using your present Tube Mill Equipment and increase your output.

Bradley Pulverizer Co., Boston, Mass.

Works: Allentown, Penna.

Manufacturers of Pulverizing Machinery for 30 Years

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WEBSTER

Sand and Gravel Plant Machinery

*T*he Sand and Gravel Plant Equipment built by this company is more appreciated by the operator five or ten years after its installation than it is at the outset.

As the years go by he comes to know that Webster Equipment is not only well designed, but is unusually well built—exceptionally staunch and long wearing.

Today, after over forty years of honest manufacture, this company is coming into the fruits of its sound policy of making each item of equipment as good as it knows how.

Today, the Webster factory is crowded with orders considerably beyond its liberal production capacity.

Operators interested in the type of machinery that is responsible for this excess demand, will be serving their own interests by starting negotiations well in advance of their anticipated needs.

THE WEBSTER M'F'G COMPANY
TIFFIN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

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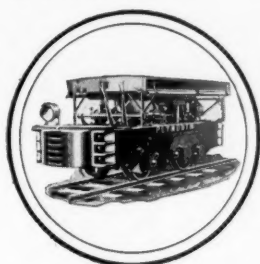
"A Great Help to Industry"

says the management of the Illinois Zinc Company—"They save time, accomplish more work, and at far less cost per ton."

PLYMOUTH

Gasoline Locomotives

are a permanent unit of this great industry which is at present stretching its capacity to the utmost in supplying Zinc to the world.



"Plymouth" Haulage

In the Mines, on the Surface, and Elevated—is an investment that results in "More Tonnage at Half the Cost." Sturdily built to stand every day service—Easily operated—Low cost of upkeep.

The Plymouth Is Now Used All Over the World and all users recommend it as a good investment.

What Is Your Haulage Problem?

Write us about your present haulage system and let our engineers determine the fitness of the Plymouth. We are glad to consult with you.

Get the facts—Ask for illustrated catalog showing the many phases of "Plymouth" Haulage—What it is doing for others it will do for you.

The Fate-Root-Heath Company

210 Riggs Ave., Plymouth, Ohio

Representatives in all Principal Cities of America



Some Users of Telsmith Primary Breakers

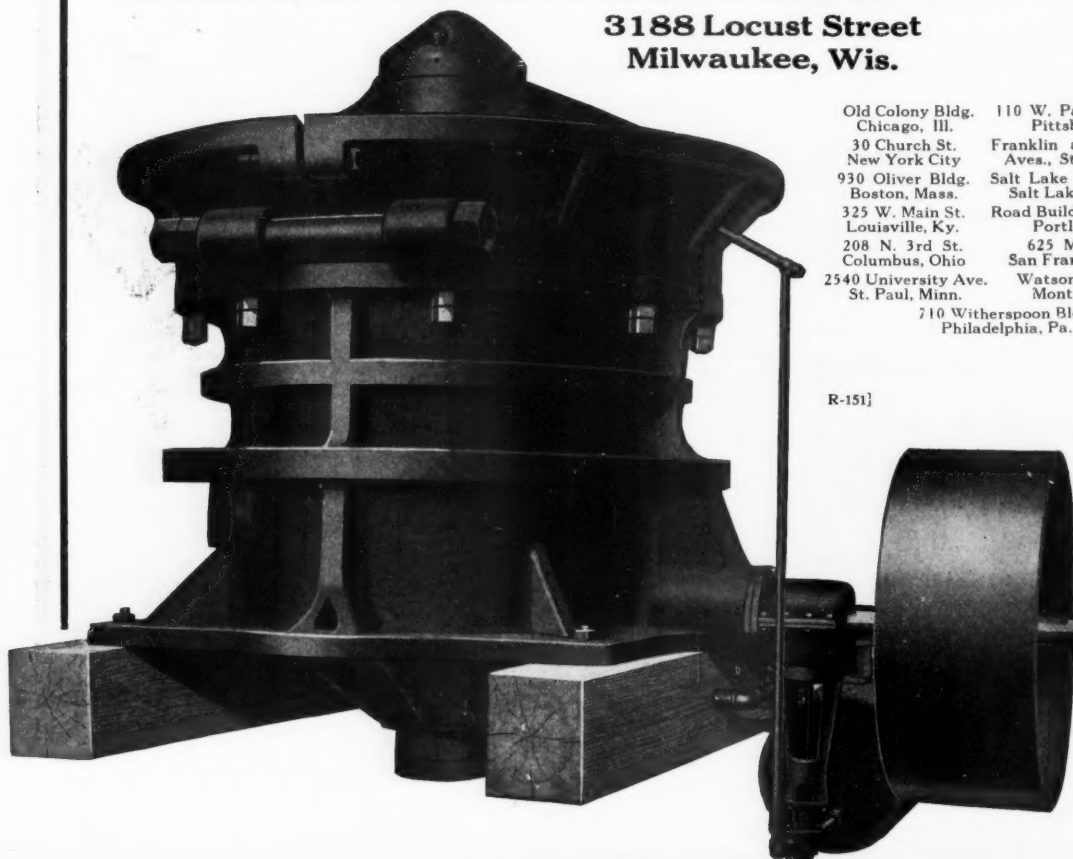
Do you wish to find out for yourself the sterling service that is uniformly rendered to all users of Telsmith equipment? Go to the **ULTIMATE AUTHORITY**—the user. Here are the names of a few people who work with Telsmith and regard him as an old, reliable henchman:

Defrain Sand Co., Philadelphia, Pa.
 Thomas Iron Co., Wharton, N. J.
 Charles Warner Co., Wilmington, Del.
 E. J. Lavino & Co., Philadelphia, Pa.
 Thomasville Lime & Stone Co., Thomasville, Pa.
 Standard Chemical Co., Canonsburg, Pa.
 Webster Stone Co., Irvington, Ky.
 W. F. Woodruff, Louisville, Ky.
 Nashville Ry. & Light Co., Nashville, Tenn.
 Quenelda Graphite Corp., Lineville, Ala.
 United Railways Co., St. Louis, Mo.
 A. R. Young Const. Co., Little Rock, Ark.
 Federal Lead Co., Flat River, Mo.
 Stringtown Crushed Rock Co., McAlester, Okla.
 Penn Iron Mining Co., Vulcan, Mich.
 Liberty Bell Gold Mining Co., Telluride, Colo.
 Story Rock Co., Bozeman, Mont.
 Pacific Mines Corp., Ludlow, Calif.
 Phelps-Dodge Corp., Tyrone, N. Mex.
 United Eastern Mining Co., Oatman, Ariz.
 Rand Consolidated Mines Co., Goudreau, Ont.
 Teck Hughes Gold Mining Co., Cobalt, Ont.
 Dept. of Highways, Toronto, Ont.

An inquiry to any one of the above will bring to you volumes more about Telsmith equipment than can be told in the most imposing advertisement. Glad to send you our catalog No. 166 (Telsmith Primary Breakers) and Bulletin No. 2-F-11 (Telsmith Reduction Crushers).

SMITH ENGINEERING WORKS

3188 Locust Street
Milwaukee, Wis.



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325 W. Main St. Louisville, Ky.	Road Builders Equip. Co. Portland, Ore.
208 N. 3rd St. Columbus, Ohio	625 Market St. San Francisco, Calif.
2540 University Ave. St. Paul, Minn.	Watson Jack & Co. Montreal, P. Q.
	710 Witherspoon Bldg. Philadelphia, Pa.

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Pumps Make a Distinctive Showing in the Phosphate Fields of Florida

Hydraulic methods of mining and Morris Pumps for the Hydraulic excavating are used with great success in the pebble phosphate fields in the vicinity of Bartow and Lakeland, Fla.

The Mining Operations can be divided into two stages: (1) Stripping the overburden. (2) Mining the phosphate matrix.

The force of the giant nozzle operated by a Morris Multistage Pressure Pump washes down the material to the Morris Mining Pumps, which, in stripping, deliver the overburden to a spoil area, and in mining deliver the phosphate matrix to a washer.

The water is supplied to the Giants through a 10-in. Pipe which branches out into three 6-in. lines, each of which supplies one Giant. The pressure used at the nozzles varies from 120 to 150 lbs. per square inch and still higher pressures will probably be used in the future.

The output of a 12-in. pump under average working conditions pumping through 900 ft. of 12-in. pipe against an elevation of 50 feet is from 113,000 to 126,000 cu. yds. of material per month, or from 181 to 202 cu. yds. per actual working hour. An exceptionally good record of performance for a 10-in. pump is 272 cu. yds. per hour averaged during continuous operation for a month.

The mixture of water and material resulting from the action of the Giant against the face of the bank contains from 10 per cent to 25 per cent solids and flows on a slope approximately of 5 per cent.

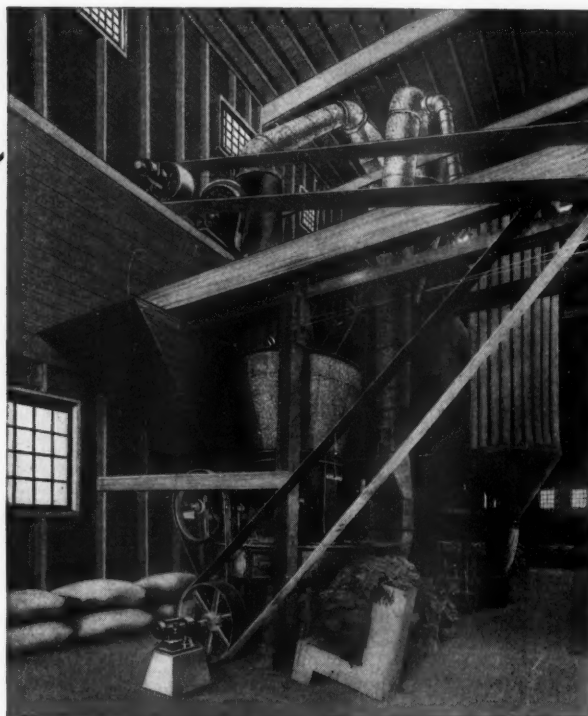
It's the MORRIS Reputation for such performance that has put more MORRIS Pumps in service since 1864 than all other makes combined

We have a size and style of pump to meet your requirements. Write us.

Morris Machine Works, Baldwinsville, New York

Branch Offices in Principal Cities

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The photograph shows one of our 2-Roller Mills which is giving a constant capacity of 2000 pounds per hour, grinding a good grade of limestone to 99.5% and finer passing a 200 mesh, with an expenditure of 40 horsepower.

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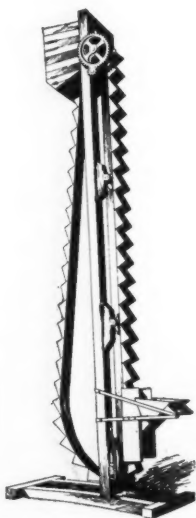
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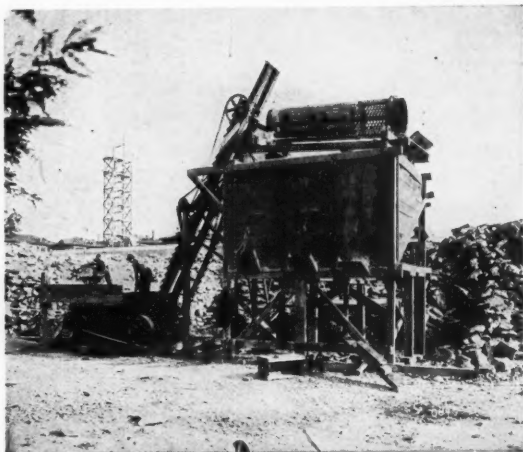
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Road building outfit showing Jeffrey Continuous Bucket Elevator, which carries stone from crusher to revolving screen



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Rock Products

Vol, XXIII

Chicago, January 31, 1920

No. 3

Hydraulic Methods in the Florida Phosphate Fields

Development in Hydraulic Excavating and Conveying of Equal Interest to Quarry Operators for Stripping and to Sand and Gravel Plant Operators

THE HYDRAULIC METHOD of mining is followed almost exclusively in the pebble phosphate fields in the vicinity of Bartow and Lakeland, Fla.

The mining operations can be divided into two distinct stages: (1) Stripping the overburden. (2) Mining the phosphate matrix. The two operations are identical in regard to the methods pursued and the same descriptions apply to both.

The overburden consists of from 10

By Victor J. Milkowski

Engineer in Charge of Dredge Department, Morris Machine Works, Baldwinsville, N. Y.

ft. to 35 ft. of material made up approximately as follows: (1) Top layer of fine sand and soils from 1 to 2 ft. in thickness. (2) Layer of hard black clay, similar to hard pan, from 1 to 4 ft. in thickness. (3) Deposit of sand and clay in

varying proportions and stratification.

It is frequently found necessary to blast the top layer of clay to break it up, as the force of the giant nozzle is not sufficient to do so. The phosphate matrix consists of a fairly soft and homogenous conglomerate of sand and gravel with but an occasional stone larger than 2 in. in diameter. The phosphate bearing material occurs in pebbles varying in size from $\frac{3}{64}$ in. to $1\frac{1}{2}$ in., and constitutes from 8 per cent to 35 per



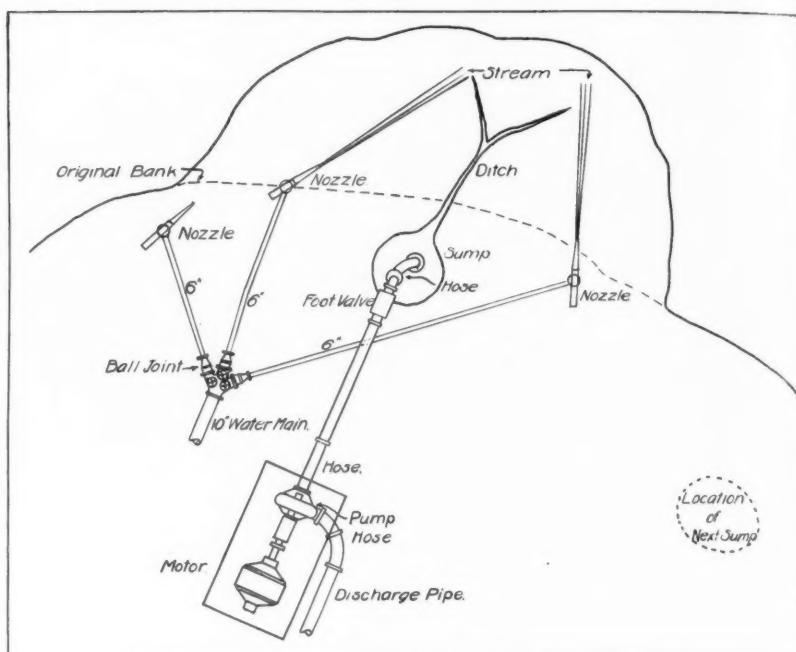
Fig. 1—Hydraulic monitors operating under high pressure, flushing material to sump

cent of the total material in the matrix.

The depth of deposit varies from 10 to 30 ft., and the material is underlaid by a layer of limestone. These different deposits are clearly shown in the view (Fig. 2). In the upper right-hand corner is shown a mining pump which has been used in stripping the overburden resting on the phosphate matrix. At the left of the picture is shown another mining pump which is being used now in mining the phosphate matrix and resting on the bottom layer of limestone.

The method of operation consists in creating a sump or a pool into which the material is washed down by means of hydraulic giants operating under a high water pressure, and of pumping the resulting mixture of water and material by means of a dredging pump to the desired point. This is clearly illustrated in the view (Fig. 1) and by the accompanying sketch.

The water is supplied to the giants through a 10-in. pipe, which, close to the site of operations, branches out into three 6 in. lines, each one of which supplies one giant. The giants are of the standard double jointed type and are furnished with nozzles varying from $1\frac{1}{2}$ to 2 in. A ball joint or a section of rubber hose is installed in each 6-in. line next to the 3-way lateral to permit of moving the giant as desired. The pressure used at the nozzle varies from 120 to 150 lbs. per sq. in., and it is probable



Sketch showing arrangement of nozzles and sumps

that still higher pressure will be used.

In practice only two giants are ordinarily used to each mining pump, the third giant being used as a reserve and for sweeping any material not reached by the other two. The stream from the giant is played at the foot of the

bank to undermine it and to cause it to cave in. To sluice the material to the sump, ditches are cut either with the giant or by blasting leading to this sump. This operation is well illustrated in the view (Fig. 2), and the accompanying sketch. In this view in the lower



Fig. 2—Sump in foreground—also shows stripping and phosphate rock layers

left-hand corner, may be seen the sump and ditches leading to it, which have now been abandoned and the suction taken to the location shown. The giants are operated at from 20 to 40 ft. from the bank.

The mining pumps are all of Morris design, either 10 or 12 in. size. The pumps are direct connected to variable speed induction motors mounted in a portable housing as shown in Fig. 3.

The suction line to the pump consists of a section of rubber hose placed next to the pump, with the necessary pipe line, a foot valve, a 45-degree elbow, another length of rubber hose with a 45-degree elbow turned in on the bottom of the suction hose. The reason for turning in the 45-degree elbow on the bottom of the suction hose is to prevent entrance of rubbish into the pump. The suction hose and elbow are supported from tackle blocks from a tripod set up over the sump.

The arrangement of the whole suction line is clearly illustrated in the view (Fig. 3). The length of the suction line varies from 50 to 150 ft., and the suction lift varies from 8 to 15 ft. The pump is moved each time from 40 to 90 ft. By working the suction around it is possible to clear up all materials within a radius of 190 ft. from the pump.

The operating crew for each unit consists normally of the following: One foreman, two giant operators, one pump operator, three laborers. If the material is lifted to a considerable height or pumped through a long discharge line additional pumps are used in the line for booster pumps and each additional pump requires a pump operator.

The output of a 12-in. pump under average working conditions, pumping through 900 ft. of 12-in. pipe against an elevation of 50 ft. is from 113,000 to 126,000 cu. yds. of material per month, or from 181 to 202 cu. yds. per actual working hour. An exceptionally good record of performance for a 10-in. pump is 272 cu. yds. per hour, averaged during continuous operation for a month.

The overburden material is pumped into old pits or into specially prepared spoil areas. The phosphate matrix is pumped to the washing and screening plant and the waste water and material is pumped again by means of another mining pump to a suitable spoil area.

The view (Fig. 4) illustrates a discharge from a 10-in. pump.

The view (Fig. 5) illustrates a screening plant used for separating the phosphate bearing material.

The mixture of water and material resulting from the action of the giant against the face of the bank contains from 10 to 25 per cent solids and flows on a slope approximately of 5 per cent. The percentage of solids in the mixture

is dependent upon the hardness of the material in the bank and upon the pres-

sure at the nozzle, being greater for higher pressure and in soft material.



Fig. 3—Suction line and pump setting

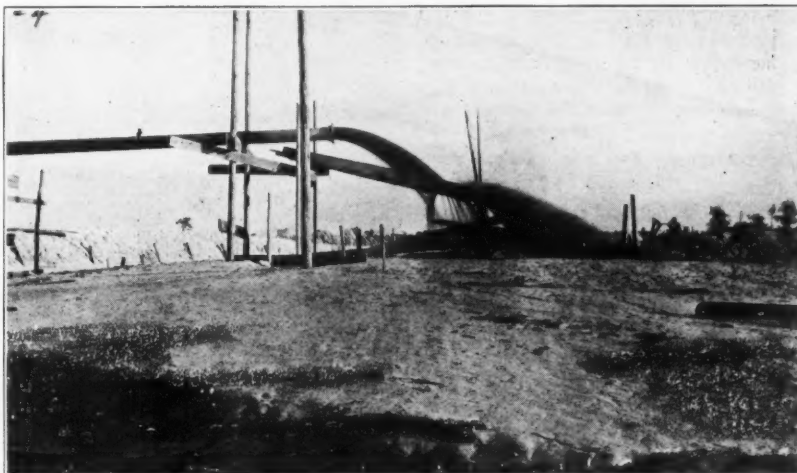


Fig. 4—Discharge of a 10-in. pump

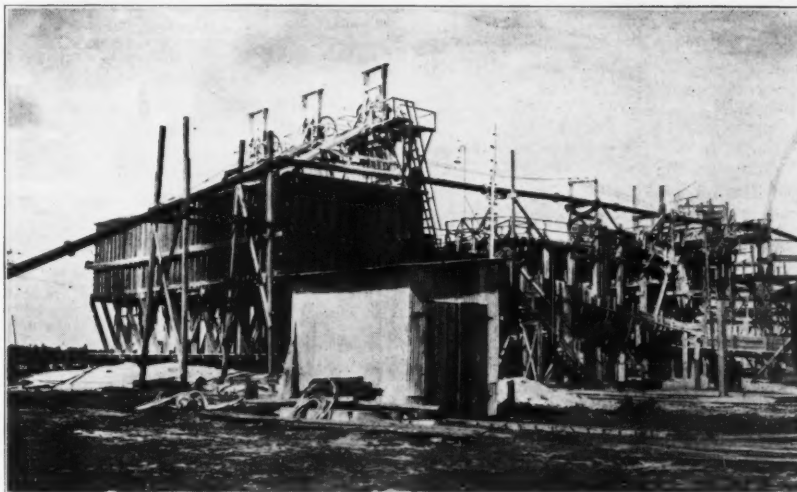


Fig. 5—Screening plant for phosphate separation

Annual Meeting of the Ohio Macadam Association

Annual Banquet One of the Big Events in the State Capital's Winter Season

ON JANUARY 13 the Ohio Macadam Association lived up well to the reputation it has established in the last three or four years as host to the road-building, public-sentiment-forming men of the state. The members and guests at the annual banquet this year numbered close to 350, and included nearly all the members of the state legislature, supreme court justices, state and county highway officials, prominent Grange officers, county agricultural agents, etc.

Secretary Sandles' annual feed and intellectual treat have become so famous that there is now keen competition for the "meal tickets," and difficulty is found in obtaining a banquet hall big enough to accommodate the crowd. It is a strange and curious thing, too, but a crushed-stone man is never on the program, and they are not much in evidence in the crowd of 350, yet Mr. Sandles so manages the affair that every speaker is a good roads booster and an enthusiast for macadam roads.

This year the program included:

SENSE AND NON SENSE

A. P. Sandles, Toastmaster

C. C. Lattimer, Songmaster

"The Old World and the New"

—Hon. Wm. G. Sharp, Ex-Ambassador to France

"The Call to Colors"

—Lieutenant-Colonel Ralph D. Cole

"A 33d Degree 'Good Roadster'"

—Hon. A. R. Taylor, State Highway Commissioner of Ohio

"Watchman, What of the Night?"

—Hon. John G. Price, Attorney General

"The Rainbow Comes Down in Ohio"

—Ex-Governor James E. Campbell

"Lifting Common Folks Out of Mud and Mire"

—Hon. Franklin P. Riegler

"Sky-scrapers and Meal Tickets"

—Hon. James G. Johnson, Supreme Court Justice

"A Square Deal for Rural Ohio"

—Hon. L. J. Taber, Master Ohio State Grange

"Old Glory vs. the Red Rag Flag"

—Hon. Hugh L. Nichols, Chief Justice of Ohio

"Meat in the Smoke House and 'Taters in the Cellar'"

—Hon. Myers Y. Cooper, President Ohio Fair Boys

"The Good Old Days Are Coming—Not Gone"

—Hon. John Henry Newman, State Librarian

"The Good Road Is a Cornerstone of National Welfare"

—Hon. George F. Rudisill, State Director Ohio Good Roads Federation

Traffic Conditions Discussed

One of the principal topics discussed at the annual business meeting of the Association on January 14 was the present railway situation and the prospects of relief.

The traffic committee, of which P. C. Hodges of the Marble Cliff Quarries Co., Columbus, is chairman, made a report which did not give a very rosy outlook on the car situation in 1920, but Mr. Hodges did not seem to think that there would be any general advance in crushed-stone freight rates if the matter were left to the railways. It will be easy in many instances to

urged that all the quarrymen present join the National Safety Council.

The subject of self insurance, which is the only form of liability insurance permitted under the Ohio law to employers who do not wish to insure in the state fund, was discussed at some length. The general impression seemed to be that it was entirely feasible, especially if some form of catastrophe insurance could be had in combination with it. Mr. Souder did not think much of self insurance, even in the case of such large operator as his own company.

Specifications for Macadam

Probably the most important business transacted at the meeting was the decision to employ engineering experts to draft standard specifications for various types of macadam roads. Both the Association and individual members of it have been up against the difficulty of promoting a type of road, which they have been unable to give expert advice about. It was decided that the time has come when the quarrymen who furnish the stone should know most about the use that is made of their material, and to be in a position to recommend or even enforce a proper use of it. Poorly built macadam roads have reacted to the detriment of all macadam roads, and the Ohio Macadam Association has decided to throw its influence not only into the building of macadam roads, but for their *right* construction and maintenance. Under the term macadam the Ohio quarrymen include all forms of bituminous pavement, except those on a concrete foundation.

Barring the railway car situation a season never opened with brighter prospects for Ohio crushed-stone men than this. They have created a very powerful sentiment not only for the construction of various types of macadam roads, but also for the repair and maintenance of those already built, of which there are several thousand miles.

Old Officers Re-elected

All the 1919 officers were re-elected to serve this year. These are: President, L. H. Hawblitz, France Stone Co., Toledo; First Vice-President, E. T. Paul, Bluffton-Lewisburg Stone Co., Lewisburg; Second Vice-President, J. A. Moore, Higgins Stone Co., Bellevue; Secretary, A. P. Sandles; Treasurer, W. H. Hoagland, Marble Cliff Quarries Co., Columbus.



L. H. Hawblitz

show that crushed stone is even now carrying much more than its due share of the burden. There does appear to be considerable agitation among the railways for establishing crushed stone rates on a mileage or zone basis. President L. H. Hawblitz of the Association stated that this should be unceasingly opposed by the producers of crushed stone.

Liability Insurance

D. C. Souder, France Stone Co., Toledo, chairman of the insurance committee of the Association, reported that experience with the State Industrial Commission was very unsatisfactory and the opinion still prevailed that the rates charged were far too high. Mr. Souder commended the establishment of the "Accident Prevention" department of ROCK PRODUCTS and

Chicago and Illinois Associations of Sand Producers Combine

Largest State Organization of Sand and Gravel Producers Perfected

THE ILLINOIS Sand and Gravel Producers' Association and the Chicago Sand and Gravel Producers' Association met in joint convention in Chicago, January 14, 15 and 16, and the most important business transacted was the decision to join the two associations into one. Ben Stone has been secretary of both associations for several months past and the combination was brought about largely through his efforts.

The situation in Illinois has been somewhat peculiar in that the state is naturally divided into two great sand and gravel market zones—the Chicago district and the rest of the state. Competitive freight rates made it possible for probably nearly half the production of the state to seek a Chicago district market. The combining of the two factions into one harmonious group is a distinct achievement in association development.

The new consolidated association has a membership of 41 producing companies whose potential annual tonnage is 10,000,000, making undoubtedly the largest state association of sand and gravel producers. At the Chicago meeting were 20 producers from outside the borders of Illinois, in Indiana or Iowa, who ship into Illinois territory. A number of these are members of the Illinois Association.

Liability Insurance

One of the subjects which received the attention of the convention was the excessive rates charged by insurance companies for employers' liability insurance. The general subject of workmen's compensation insurance and its relation to the gravel industry was presented very ably in an address by P. B. Carey, of the Illinois Industrial Commission, and a very comprehensive discussion of the subject was led by George Hickox, of the Joliet Gravel Co., a newly elected member of the Association. Mr. Hickox is primarily an insurance man, being attorney-in-fact for the Illinois Mine Operators' Indemnity Exchange. The discussion, under his leadership, developed that the gravel industry has been paying premiums out of all proportion to the risk involved. A resolution was passed instructing the secretary and the executive committee to collect information that will enable the members of the Association to determine what may be done

in this matter. Any conclusions reached will be acted upon at once so that relief may be had as early as possible.

National Association Membership

Upon the motion of W. P. Carmichael of the Carmichael Gravel Co., Williamsport, Ind., the Illinois Association voted to join the National Association of Sand and Gravel Producers as a body. This action has now been taken by the Mis-

souri Valley Association and the Indiana Association, so that the National Association is assured of the support of three of the strongest producing groups in the Middle West.



M. D. Schaff, President, Illinois Sand and Gravel Producers' Association

The Illinois Association is now supported by an annual tonnage assessment of one-half cent.

Labor and Railways

The labor and railroad problems came in for their full share of discussion. The general sentiment seemed to be that there was very little prospect of getting much better transportation service in 1920 than there was last year.

Specifications were discussed in some detail and the general sentiment seems to be in favor of liberalizing aggregate specifications in order to find an eco-

Officers Elected

M. D. Schaff, of the Virginia Timber Co., Springfield, who has served as president of the Illinois Association since it was organized, was re-elected president of the new amalgamated organization. G. P. Longwell, of the Consumers Co., Chicago, was elected vice-president. B. H. Atwood, of the Interstate Sand and Gravel Co., Chicago, was elected treasurer. Ben Stone was re-elected secretary and business manager.

The executive committee, of which the president is ex-officio chairman, consists of F. E. Lane, Janesville Sand and Gravel Co., Chicago; R. A. Thomas, American Sand and Gravel Co., Chicago; H. D. Conkey, of the H. D. Conkey Co., Mendota, and V. O. Johnston, of the Lincoln Sand and Gravel Co., Lincoln.

Illinois Prospects Reported by Ben Stone

REPORTS from various sources indicate a general demand for material, although the washing season is six or eight weeks off. There will, in all probability, be a shortage of cars for sand and gravel loading early in the season. Each producer should use every means to increase car efficiency. He should keep constantly before his customers their obligations in this respect. He should seek the bulk of his business so far as he can consistently in the direction of the natural movement of the cars—in other words, toward the mines. For regardless of how we may feel in the matter, it will doubtless be some time yet before the carriers get away from their life-long idea that the primary purpose of the open-top car is to move coal. We do not have to accept this theory as just or fair, but so long as it exists we must recognize it and whatever condition it creates must be met so as to best serve our ends. One thing everyone should do is order cars in writing—most carriers furnish forms for this—and keep an accurate record from day to day of the number of cars ordered, furnished and loaded and time lost account car shortage or irregular service.—Illinois Sand and Gravel Producers' Association "Weekly Bulletin."

Missouri Valley Mineral Aggregate Producers Have Convention

Promise of Immense Amount of Highway Work During Next Four or Five Years

ACCORDING TO PRESENT estimates, about \$200,000,000 will soon be available for highway improvement work in the states of Missouri, Nebraska, Oklahoma and Kansas—states which up to this time have never gone in very strongly for hard surfaced roads.

To talk over the meeting of this demand for mineral aggregates, about 30 producers met in Kansas City, Mo., January 19 and 20, in a two-day convention. The call was issued by John Prince, chairman of the Missouri Valley Association of Sand and Gravel Producers, which has perfected its organization and is now regularly established with a salaried secretary and office. The secretary is F. A. Laughead and the office is 706 American Bank Bldg., Kansas City, Mo.

The crushed-stone men of this district are relatively few in number and are as yet unorganized. The sentiment is strong for a mineral aggregate association, but no action was taken at the recent Kansas City convention to bring it about.

Transportation Outlook

The present and prospective railroad situation was thoroughly discussed and very little ground for comfort regarding 1920 business was found. H. F. Curtis, the largest producer of sand and gravel in Nebraska, stated that the railway car situation was the most serious problem the industry had ever faced. He said that the supply of cars and motive power was about the same now that it was in 1915, with no signs of immediate relief.

Various members had tried shipping in box cars and even in stock cars, but the use of such cars was generally condemned as very unprofitable. Only where the material may be pumped into the cars direct is the loading of box cars at all feasible.

Labor

Sand and gravel producers pronounced the labor situation as easing up and quite able to take care of itself. Quarrymen, on the other hand, said that labor was becoming increasingly difficult to get and keep. Fred Johnson, of the Prince-Johnson Limestone Co., Kansas City, said that fluctuation in labor supply, or the labor turnover, sent his labor costs 50 per cent above what they should have been with a fairly normal condition. The price of crushed limestone in the Kansas City market advanced from \$1.30 per ton at the begin-

ning of last season to \$2 per ton at the beginning of this year because of these labor conditions.

Fred F. Ratcliff, of the Tulsa Sand Co. and the Hughes Stone Co., Tulsa, Okla., stated that the movement for open shop in all industries was making rapid headway in Kansas and Oklahoma. At present only his steam-shovel men are organized.

Cash Discounts—Trade Acceptances

The Kansas City producers have inaugurated a system of cash discounts on all



John Prince

bills paid within 10 days of the date of the invoice. Mr. Prince stated that 50 per cent of the business now transacted in Kansas City was thus done on this cash basis, much to the advantage of the producers. This discount is 5c per yd., or 4c per ton. In reality it is not a discount, but is added to the price of the material as a penalty for not making prompt payment. This scheme is rigidly enforced, and Mr. Prince says it takes the place of a credit bureau.

To take care of customers or contractors who cannot take advantage of the cash discount, the Kansas City producers have introduced the practice of taking 30-day sight drafts, or, as they term them, trade acceptances. These are negotiable and materially assist in financing the operations. Mr. Prince said that the 1919 business in the district paid for by this method amounted to at least \$100,000.

Offers Co-operation of Cement Producers

Forest Kaufman, district engineer of the Portland Cement Association at Kansas City, gave an estimate of the immense amount of road and pavement work in progress in his territory and said that in 1919 only about one-fourth of that contemplated had been completed. He admitted that the transportation situation was at the bottom of the aggregate shortage problem. He said the object of the Cement Association in making mineral aggregate surveys in the various states was not to promote side-of-the-road plants, but to encourage the investment of more capital by present producers.

Mr. Kaufman went into detail as to highway and pavement projects in Missouri, Nebraska, Kansas and Oklahoma, and stated that if all the projected work was undertaken the material men would have their hands full. He said the transportation and labor problems had the same effect on the cement industry as on the mineral aggregate industry in the way of curtailing production. He estimated that the cement plants of his district were cut to about 55 per cent of normal production by these conditions in 1919.

Railroad Legislation Situation

E. Guy Sutton, secretary of the National Association of Sand and Gravel Producers, was present and gave a summary of his conclusions from a recent trip to Washington, where he testified before the conference committee of Congress on railway legislation. He thought the Cummings bill, with its 5½ per cent guaranteed on railway income, would pass. He called attention to the provisions of this bill which take care of the distribution of cars to coal mines in times of car shortage, and pointed out how this would affect sand and gravel producers adversely.

Mr. Sutton said that the chances were strong that both the Association of Railway Executives and the Interstate Commerce Commission would maintain independent car service bureaus at Washington corresponding to that of the present Railroad Administration. Hence car distribution would continue indefinitely to be a matter of national scope and it is absolutely essential for their fair treatment that sand and gravel producers be represented by a strong national organization.

Specifications for Sand and Gravel

Mr. Sutton considered that specifications for sand and gravel were something which must be adjusted to the material in each and every locality. He outlined the progress made in the attempt to standardize specifications, and concluded that this work must be confined largely to broad general definitions as to sizes and quality. He said the proposal was to divide gravel into six standard sizes, 3-in., 2-in., 1½-in., 1-in., ¾-in. and ½-in., and to provide that from 40 to 70 per cent of a mixed gravel shall pass a mesh one-half of that of the maximum specified in the particular case.

The chief bone of contention now between the highway engineers and the producers appears to be the tolerance of ¼-in. material in gravel. The producers want a leeway of 15 per cent, of which 5 per cent may be below ¼-in. size. The exigencies of commercial gravel-plant operation make it difficult to eliminate a smaller percentage of fine material without greatly reducing production.

F. W. Peck, of the Muncie Sand Co., Kansas City, pointed out that it is practically impossible for a river sand producer to conform to any standard in sizes. High water inevitably resulted in the deposit of much fine sand, which must be gotten rid of before the coarser sand can be produced.

Insurance

The very interesting facts were developed that it is impossible to get fire or marine insurance on the floating equipment used in river sand and gravel operations, and that Kansas City producers had long ignored this item. A little investigation of the experience of six producing companies in four years showed that 20 per cent of the value of such equipment should be charged off yearly to marine insurance, or probability of loss by fire and flood.

The possibility of the Association organizing an insurance branch to write these risks was discussed and was considered feasible.

Entertainment

Those present enjoyed two luncheons, a dinner and a theater party at the expense of the Missouri Valley Mineral Aggregates Association.

Solvay Process Co. Case Now Settled

THE PETITION OF THE RAILROAD ADMINISTRATION for a rehearing or re-argument of the Solvay Process Co. vs. the Delaware, Lackawanna & Western R. R. Co. crushed-stone freight rate case has been denied by the Interstate Commerce Commission, and the decision as published in *Rock Products*, December 20, pp. 15 and 28 and 30 therefore stands.

The New York State Highway Commission has already attacked successfully

rates charged on road-building materials in interstate hauls. In two instances the Interstate Commerce Commission has ruled that the rates charged were unreasonable and has ordered reductions, or prescribed what reasonable rates are.

The Interstate Commerce Commission made the following statement: "By provision of Traffic Circular No. 9, dated April 14, 1919, the carriers under Federal control were authorized to apply rates on crushed stone, sand and gravel, shipped during the period from May 1 to Dec. 31, 1919, inclusive, when for use in road building or road maintenance, and when consigned to, and the freight thereon is paid by, state government, of 10 cents per net ton less than the regularly published tariff rates in effect at the time, but with a minimum charge of 40 cents per net ton. This special authorization may be applicable with respect to the rates herein found to be reasonable, but we have no authority to require it to be observed."

New York State Rates on Crushed Stone, Sand and Gravel

IN A REPORT on No. 10471, State of New York, Commission of Highways vs. West Shore et al., Opinion No. 5977, 55 I. C. C., 619-24, the Interstate Commerce Commission has condemned as unjust and unreasonable rates on crushed stone from Tomkins Cove, N. Y., to various destinations in the State of New York, at distances of 29 to 60 miles, the unreasonableness being to the extent that they exceeded the rates subsequently established. A further holding was that the rates on sand and gravel from Buffalo to Emerdale, Alloquin, and Flint, N. Y. (distances of 90 to 100 miles), were unjust and unreasonable to the extent that they exceeded 8c. per 100 lbs. (\$1.60 per ton), subsequently established. The latter rate, Chairman Aitchison, author of the report, said, was not unreasonable or unjust.

A rate of \$1.40 per ton on crushed stone from North Le Roy to destinations 60 to 70 miles distant was held to be reasonable.

No producer took part in these cases.

Rate Decision on Sand

THE INTERSTATE COMMERCE COMMISSION has held unreasonable and awarded reparation on rates on sand from Turner, Kan., to destinations in the switching limits of Kansas City, Mo.-Kan., (distance about 6-10 miles), in a report on No. 10365, Kaw River Sand & Material Co. vs. Aitchison, Topeka & Santa Fe et al., opinion No. 5989, 55 I. C. C., 683-7. The holding was that the rates on sand in carriers' equipment from the complainant's plant near Turner on

deliveries within the Kansas City switching district are, and for the future will be, unreasonable, to the extent that they exceed 2c per 100 lbs., and relatively unjust and unreasonable, to the extent that they exceed the rates in effect from Sirridge. The Commission further found that the complainant and the Stewart Sand Co., an intervener, had been damaged to the extent that the rates they paid exceeded those found reasonable.

Illinois Bids for Portland Cement for Roads

ACCORDING to the Chicago Tribune's Springfield correspondent, Oscar E. Hewitt, the cement manufacturers of the Middle West cannot supply the 1920 demands. Under date of January 25 he reports:

"Illinois has a 1920 program for the construction of more than 1,100 miles of permanent roads, in addition to completing contracts awarded last year.

"The new surveys have been completed, the plans drawn, the specifications prepared, and now comes the stumbling block. The state is unable to get contracts for 900,000 bbls. of cement.

"For the new work Director of Public Works Bennett advertised for 2,800,000 bbls., but the cement companies submitted bids for only 1,100,000. They have been persuaded, after much begging, to supply a trifle over 1,800,000.

"Just what the state will do has not been determined. The contracts have been awarded and they are going through the processes now of being formally completed. The highway department can eliminate some of the work it intended to do, or it can go into the open market and buy—but at what price and under what conditions only the cement makers and the angels know.

"The cement manufacturers awarded contracts, together with the amount they have agreed to deliver and the price per bbl., follow:

Cement Co.	Amount.	Price.
Universal	500,000	\$1.70
Atlas	500,000	1.85
Lehigh	250,000	1.80
Marquette	200,000	1.75
La Salle	175,000	1.80
Sandusky	120,000	1.75
Continental	50,000	1.85
Missouri	35,000	1.85

1919 Prices Prevail

"The prices are for cement on board cars at the mills of each maker. Only two raised their 1919 prices.

"On work for which contracts were awarded last year, the cement companies are obligated to deliver yet about 1,500,000 bbls. But in making contracts for this year the companies have stipulated that they will not supply cement at the prices named except for 1920 work.

Annual Meeting of the Ohio Sand and Gravel Producers

Lake, River and Bank Operators Find They Have Much in Common and Profit by Co-operation

WITH PRACTICALLY 100 per cent of its members and a number of visitors present, the Ohio Sand and Gravel Producers Association celebrated the ending of its third year of successful activities at its annual meeting held at Columbus, Ohio, January 20-21. It was the general consensus of opinion that in spite of the many setbacks of the past operating season, the year 1919 has been a good one and that the prospects for 1920 are much better.

Officers Elected

The officers elected for the ensuing year are as follows: President, R. E. DoVille of the Lake Sand and Gravel Co., Toledo; Vice-President, F. E. Hall of the T. J. Hall Co., Cincinnati; Secretary-Treasurer, F. C. Fuller of the Portsmouth Sand and Gravel Co., Portsmouth; and Executive Secretary, Guy C. Baker, of the Greenville Gravel Co., Greenville. The executive committee consists of Harry Donnelly of the Ohio Ballast Co., Cincinnati; R. H. Gill of the Concrete Materials Co., Columbus; Frank Tejan of the Wiggim Crushed Stone and Sand Co., Dayton, E. A. Evans of the Zanesville Washed Gravel Co., Zanesville and F. D. Coppock of the Greenville Gravel Co., Greenville.

In making the report of the nominating committee, Chairman Harry Donnelly stated that there were two reasons for this selection of men; first because of the division of territory, the president being in the north, the vice-president in the south and the executive secretary in the central part of the state; second, the president is a lake sand and gravel operator, the vice president a river operator and the secretary is a bank gravel operator.

The Ohio sand and gravel operators have had some difficulty in showing the lake operators who dredge sand and gravel from the lake and float it to their docks how their interests, the interests of the river operators and the bank operators are one and the same. It is believed that the present organization will do much toward establishing this relation.

Aside from the business transacted, the executive secretary, Guy C. Baker, had prepared an instructive and interesting program of talks on the different phases of the industry.

C. M. Ault, of the Barnes Sand and Gravel Co., Piketon, spoke very effectively on the value of association work as follows:

Co-operation

"Co-operation among sand and gravel producers is in some respects more difficult than in most other businesses because all produce practically the same grades and quality of material, to be used for practically the same purposes. Probably 99 per cent of the sand and gravel produced by members of this as-

have no territory exclusively their own, but must meet other producers on the common ground and compete for all their business.

"In this case producers can be benefited, not by combining to fix prices, but by being fair in their competition. We should all remember that the proper attitude is 'Get the business at a fair price if you can, but if not, let the other fellow have it at a fair price.' Do not quote a price that will make the other fellow cut his price when it is evident you can not get the business.

"There are many ways in which we, as an association and as individual producers, may co-operate to the benefit of all.

"Since the organization of our national and state associations there have been many instances of the good of co-operation, brought about mainly through the hard and efficient work of the executive secretaries of these two organizations.

"We have, through them, worked hard to get relief from the unjust freight rates imposed upon our business during the past two years. Not much has been accomplished in the way of reductions, but who knows where these rates might now be had not these men been looking after them and protested against every mention of increase.

"Let me say here that we are not through with this. I know that the railroad corporations have withdrawn from governmental employment certain of their rate-making men and put them to work on a freight rate revision to be sprung as soon as the roads return to corporate control. Of course, this revision does not mean a lowering of rates, and it is up to us to get together and try to prevent an advance in our rates. This we are justified in doing.

"Co-operation will aid us in securing the passage of laws fair to us and for the good of the general public. It will help prevent the passage of statutes that are wrong in principle, and secure the repeal of those that have been passed. It will also help us to get justice under the present laws.

"We can co-operate in helping our fellow producers get rid of surplus material when he has an excess over his demands.

"I believe that we as producers of sand and gravel are not following the



R. E. DoVille, President, Ohio Association of Sand and Gravel Producers

sociation goes into the construction of concrete, mortar for brick work, plastering, road surfacing or railroad ballast.

"There is not the opportunity to branch out and specialize in our business that many other lines afford. Another reason why co-operation is difficult is the fact that the territory which each of us can normally supply is surrounded by a seemingly impregnable wall of freight rates. Most producers have a territory that, by reason of these rates, is exclusively his own and to which under normal conditions of production no one else can supply. Some, like ourselves,

best methods of co-operating in promoting road construction. I am heartily in favor of a closer relation with the cement producers in this matter. I believe that not only the sand and gravel producers but the crushed stone producers will shortly come to this conclusion.

"We can do our business much good by co-operating with our customers in keeping them supplied with material as they need and can handle it. We can co-operate with the car distributors of our railways regarding regular car supply.

"There are dozens of commendable ways by which we can make our business both more pleasant and more profitable by co-operation. And finally, if this country and the world is saved from radicalism and bolshevism—as it will be—and the remuneration of our labor, our brains and our capital again established on a solid, sensible basis, it will be done by the co-operation of the level-headed business men, producers, consumers, capitalists and laborers of the country."

Sand and Gravel Specifications

Another talk was given by A. N. Johnson, chief engineer of the Portland Cement Association. At this time he gave an explanation of a proposal of his association to specify uniform-strength concrete instead of specifying how this shall be obtained. Mr. Johnson states that experiments performed by Prof. Duff A. Abrams for the Portland Cement Association, prove that the strength of concrete is not dependent upon certain specified sizes of aggregates, but that concrete of 3,000 lbs. per sq. in. crushing strength may be obtained by an almost infinite number of combinations of different sizes. The governing points are the ratio of coarse and fine aggregate and portland cement. This paper by A. N. Johnson will be made public about February 3, at the annual meeting of the Mississippi Valley Association of Highway Officials.

C. H. Duncan, secretary of the Contractors' Association of Ohio, explained why and how closer relations between the contractor and the producer should be brought about. Since the success of either the contractor or the producer is dependent to considerable extent upon co-operation of both, a live discussion followed and much information was obtained by both sides. The Contractors' Association is ready to co-operate with the sand and gravel producers in such mutual problems as car supply and rates.

The Three Operations

One of the interesting items of the program was a series of three short talks. F. E. Hall started by explaining that "Sailors and Bankers Have Nothing on Me." Mr. Hall is from Cincinnati, where the T. J. Hall Co. is a large river op-

erator. Because of his extensive operations and fleet of boats, Mr. Hall has acquired the title and was introduced as "The Admiral." He explained how river sand and gravel operation compares with other methods.

J. D. Reynolds, from the Lake Erie Sand Co. at Sandusky, talked on "I Knew He Was a Sailor." Mr. Reynolds explained that he was a sailor because his boats sail Lake Erie, where again the problems are different from a river operation.

"The Banker" (bank sand and gravel operator) was represented by Frank Tejan of the Wiggim Stone and Sand Co. at Dayton, Ohio. In conclusion, it was admitted that the sailor, the banker and the river operator, each with his different problems, could derive much benefit from a common association and

intercourse through the Ohio Sand and Gravel Producers' Association.

After the noon luncheon the Assistant Deputy Highway Commissioner talked on the "Use of Gravel for the Maintenance of Roads," A. E. Rae, Engineer of Tests of the Ohio State Highway Department, gave the Ohio practice in "Tests of Sand and Gravel."

It was decided that the next meeting should be held in the spring. In the meantime a resolution was enacted instructing the executive secretary, Guy C. Baker, to send each of the members a letter of explanation with reference to the Ohio association going into the national association as a body. This will be voted upon at the spring meeting and it was urged that all the producers interested in this subject attend that meeting.

Washed Gravel Has the Better Road-Binding Value

Iowa Tests Develop Some Interesting Data

BUILDERS OF GRAVEL ROADS have generally laid great stress on the binding qualities of the gravel employed, a certain amount of clay generally being considered an asset. For some time past gravel producers have been attempting to drive home to road builders the fact that washed sand and gravel had binding qualities, and make the best gravel road. This fact seems now to have the confirmation of the Iowa State Highway Department, which publishes the results of some gravel binding tests as follows:

"Cementing value of Iowa gravels for road building purposes does not always depend upon the amount of the clay content. This is a point being shown clearly as a result of the tests upon hundreds of samples of gravel sent in to the State Highway Commission for testing. Many of these tests have shown that when clay was entirely washed out of the sample, its cementing value was higher than with the original clay content. These tests have been in progress over a considerable period.

"A cementing value of 10 in gravel is very low; 10 to 25 is fair; 26 to 75, good; 76 to 100 and above, very good. To have sufficient binding quality to be satisfactory for road surfacing propositions, a gravel should have a cementing value of at least 50 to 75. Large proportions of the Iowa gravels tested have a very high cementing value. Reports of several tests of the unwashed gravel show a value of 500 or over.

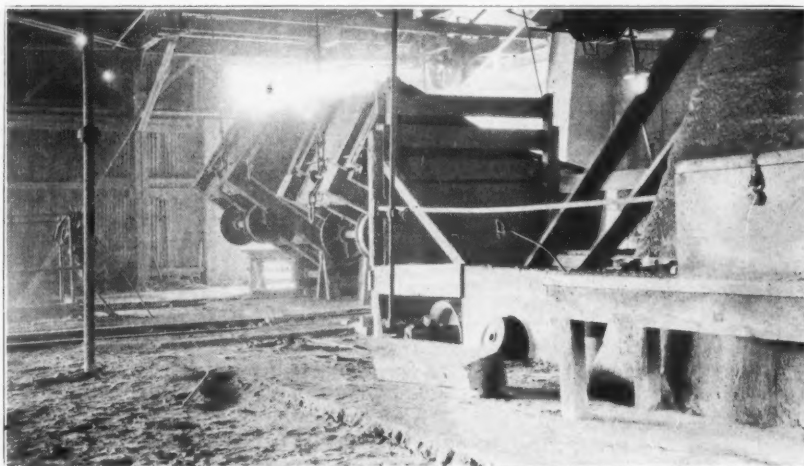
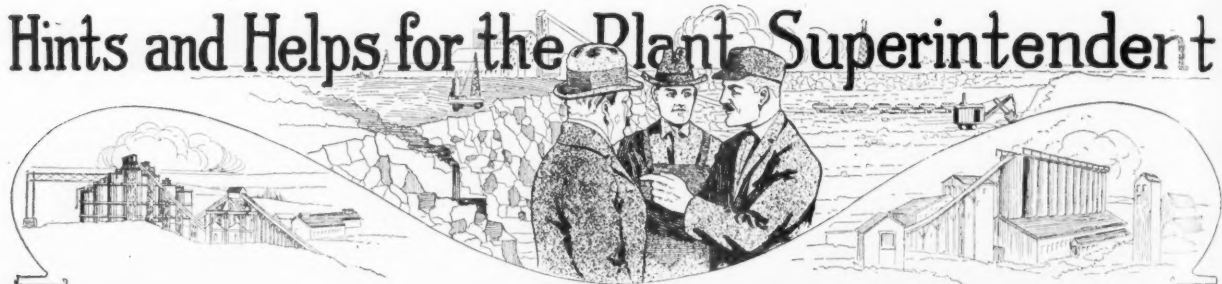
"Gravel samples are first tested unwashed as received. The gravel is then thoroughly washed and is given another test. It was found interesting to compare the relative values as received with the clay and after being washed. No. 4, for instance, tested 276 with its clay content but only 43 after the clay had been washed out. No. 5 tested 105 as received with its clay content but its cementing value after the clay had been washed out rose to 285. No. 157 tested 116 with its clay content intact but its value rose to 336 after its clay had been washed out. Sample No. 137 tested 500 with its clay and 500 after it had been washed, the presence or absence of the clay showing no change.

CEMENTING VALUE OF GRAVEL SAMPLES

Sample No.	As Rec'd with Clay Content	Clay Washed Out
4	276	43
5	105	285
157	116	336
137	500	500

"The lesson to be drawn from the test so far is that the cementing value of the gravel for road building purposes cannot be determined simply by making a clay test. The gravels which show a high cementing value with the clay intact, as a general thing pack more quickly under traffic than the gravel which has a high cementing value without the clay content. The clay free gravel which packs is much more slow to bond when placed on a road but when it does become bonded and well packed it forms a very hard and stable road surface.

Hints and Helps for the Plant Superintendent



Car dumper operated by an overhead hoist

Unusual Car Dumper

THE TWO VIEWS ABOVE show a car dumper used at the plant of the Glens Falls Portland Cement Co., Glens Falls, N. Y. Cars of crushed limestone and shale are pushed in on dead-end tracks; the front end of the car is fastened to a fixed cable and a hoisting line is attached to the rear end. A hoisting drum, driven by a worm gear from a belt-driven shaft, furnishes the power for dumping the car, which has an end gate. The operation is most simple and quicker than would at first appear.

Machine Shop Aid for Moving Heavy Objects

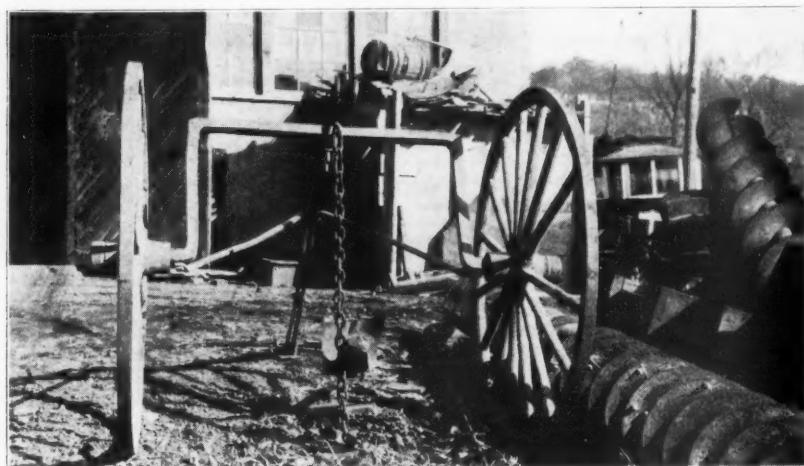
THE accompanying view shows a small rig which has been found to be of great value around the machine shop of the Bonner Portland Cement Co., Bonner Springs, Kans. This is very simple to make as the view will show; and when it is necessary to move heavy things such as car wheels or trucks about the shop it is very handy.

To operate the device the tongue is raised high in the air which lowers the front end where the chain is fastened.



Showing car fastenings

While in this position the chain is made fast to the part to be moved and by lowering the tongue to a level position the piece is swung clear of the ground and can be rolled where desired.



Truck for handling machine parts in repair shop

Car Stop for Use in Quarries

ACCIDENTS FREQUENTLY OCCUR to men handling quarry cars because these cars move unexpectedly. A western member of the Portland Cement Association has eliminated this danger by using a car stop such as that shown in the accompanying illustrations.

The center picture shows a stop located just ahead of a switch point, and illustrates the manner in which it is used. The stop is so designed that when it is not in use, it may be folded down out of the way, as shown in the upper picture, to allow cars to pass over it. The lower illustration shows the stop erected, ready for use.

Safety devices such as this are comparatively inexpensive, yet because of them, serious accidents, involving pay-

ment of considerable amounts for injury claims, may be prevented. In accident prevention, as in other activities, it is the sum total of many little things that brings big results.—"Accident Prevention Bulletin" of the Portland Cement Association.

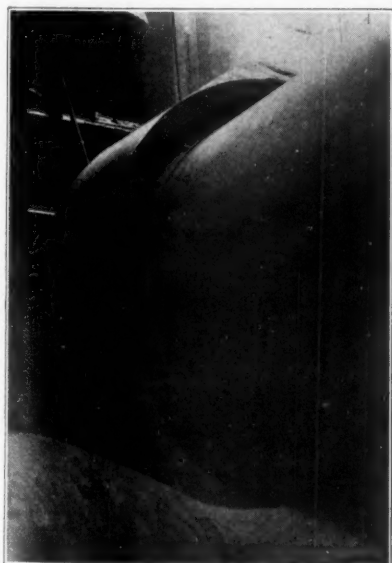
Pre-heating Air Leakage at the Firing End of Kiln

AT THE firing end of a cement kiln there is always a certain amount of air which leaks in between the rotating kiln and the hood. The ordinary method allows the cold air to come in all around the kiln and when it hits the firing zone there is a reduction of temperature.

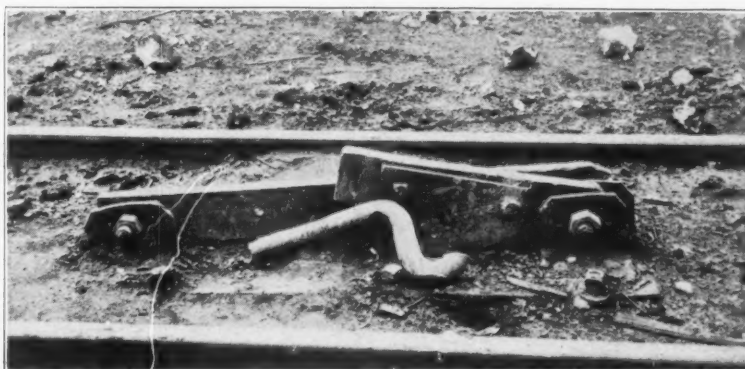
The method here illustrated and described is used by the Bonner Springs Portland Cement Co., Bonner Springs, Kans., to pre-heat this air leakage from the hot clinker as it falls from the kiln.

Instead of the flat fire-brick hood which leaves a space of several inches between it and the kiln, the hood used here has a sheet-iron, fire-brick lined band around the outside of it except at the bottom where the clinker falls out. The end of the kiln extends in under the band and close up against the fire brick lining of the hood. The iron band is about 20 in. wide and the end of the kiln extends under it several inches.

The air is drawn in chiefly from the bottom—or from over the hot clinker pit, instead of from the sides and top of the hood. Thus the air is heated by the clinker and does not have a cooling effect on the combustion gases when it reaches the firing zone.



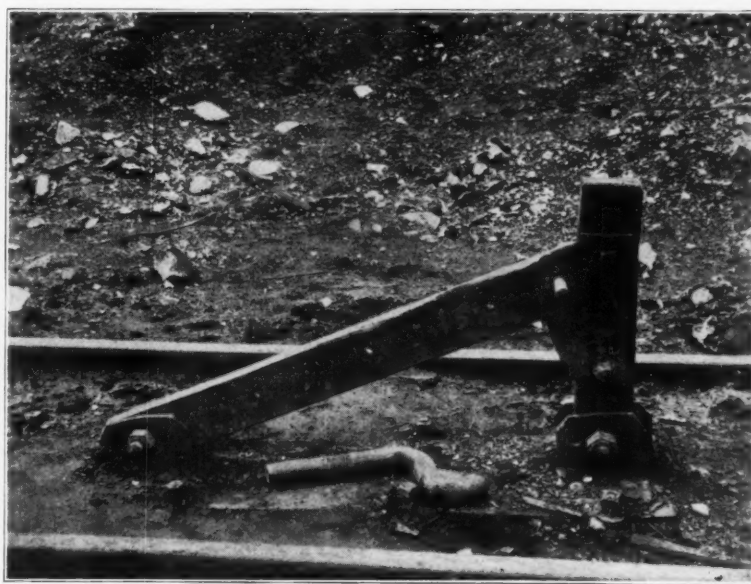
Air intake hood at end of kiln



Quarry car stop in folded position



Car stop in use at foot of incline to crushing plant



Car stop in position for business

R. B. Tyler Stone Company Plant Near Louisville, Ky.

Model 1000-Ton per Day Crushing Plant Furnishing Own Power



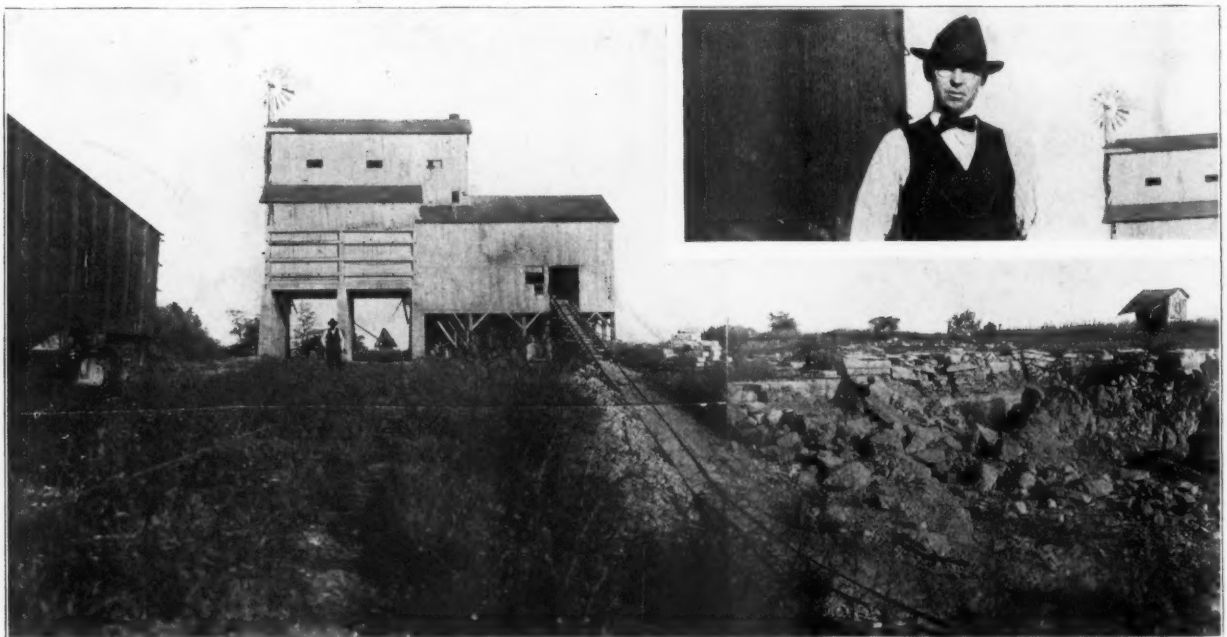
Nye steam pump set in side wall for quarry drainage

THE TUCKERS STATION PLANT of the R. B. Tyler Stone Co., just outside of Louisville, Ky., is one of the most recently-built Southern crushing plants and is considered a model for a crusher of its capacity—1,000 tons per 10-hour day.

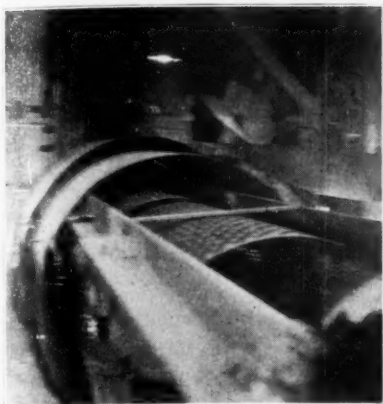
A general view of the plant and quarry is shown below. It is very compact. The power plant, consisting of a 200-h.p. horizontal steam engine, two air compressors and 300-h.p. boiler, is in the rear of the crushing plant, at ground level. The boiler plant is in an adjoin-



Horizontal engine and air compressors under crushing plant



Plant of the R. B. Tyler Stone Co.—Insert, E. M. Allen, superintendent



Single double-jacketed screens

ing structure separated from the crushing plant and engine room by a fireproof wall. The engine room is below the crushing room floor, and is equipped with a work bench and machine tools to serve as a repair shop.

The engine room is separated from the crusher by a galvanized-iron partition wall. The fly-wheel of the engine is on the crushing plant side of this wall and is connected by a belt drive to the main drive shaft of the plant. From this shaft are driven the No. 6 gyratory crusher (Gates) and bucket elevator, No. 36 crushing rolls, 6x24-ft. screen and belt conveyor for dust and rejections.

The gyratory crusher is erected on concrete foundations at about ground level. Quarry stone is brought to it by a cable-operated incline railway in 2½-yd. end dump cars. The stone is quarried and loaded by hand methods. It is classed as a dolomite.

The product of the crusher is elevated to a 6x24-ft. double-jacketed sizing screen mounted over the car-loading bins. The screening and bin arrangement are as simple and compact as the crushing plant.

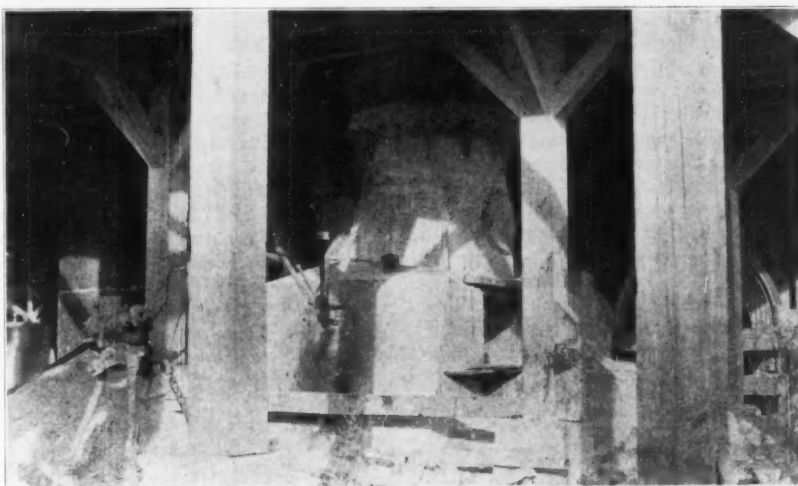
By means of the two dust jackets the single screen produces 3-in., 2-in., 1-in., clean screenings, and dust. The four bins are located directly under the screen. The demand for the dust for agricultural purposes is seasonal and any or all the bins may be used for handling it. The clean screenings are in great demand at certain times for top dressing bituminous roads.

The screen rejections are taken care of by a belt conveyor mounted over the tops of the bins below the screen which carries them back to 36-in. crushing rolls in the crusher room. The output of the rolls returns to the crusher elevator and goes back through the screen.

R. Brink Tyler is president of the company, Phil L. Hendricks is sales manager.



No. 6 gyratory crusher, incline for automatic end-dumping quarry cars



Crusher setting showing engine fly-wheel background



Conveyor belt for screen rejections and for feeding any size to No. 36 crushing rolls

Agricultural Lime Compared and Priced on Unit Basis

Suggestion for Settling Problem of Which Form of Lime to Use by Scientific Methods

NOT SO MANY YEARS AGO when most of the lime used by farmers was burned either by themselves or by small plants of two or three old-fashioned pot kilns, lime was lime and no questions were asked. Today the growth of the industry and the more general scientific knowledge of agriculture have brought many complications. It is the natural outcome of competition.

The variety of products from the limestone quarry has been the cause of much confusion. Each product has its peculiar properties, either chemical or physical, which makes it of particular value for one purpose or another, and makes it valuable for agricultural purposes. Yet, each product is sold primarily for the same purpose—to correct acidity—because, after all is said and done, lime is an indirect manure, and is needed only in specific cases as a food to sustain plant growth. It is unfortunate that there is no exact standard of comparison by which the value of lime in any form might be accurately determined. An absence of standards is responsible for retarding educational work regarding the use of lime and consequently it has retarded sales of lime.

It has always been customary to refer to lime in a very general way. The name of the material really means very little to the farmer so long as the material purchased brings results. On the other hand, trade names come to mean much and should not be confused with form names.

Agricultural Lime Covers Everything

The term lime generally includes all forms of lime. The geologist, the chemist, and the agriculturist not uncommonly make statements about the occurrence of lime in terms similar to the following: "In nature, lime exists abundantly, chiefly as calcium carbonate or carbonate of lime, in the forms of limestone, marble and chalk. It also occurs in combination with magnesium and other chemical elements. Oyster shells and clam shells are composed almost entirely of calcium carbonate, and after proper manufacture, serve the same purpose in soil improvement as similar products manufactured from limestone."

Such discussions are common, and they are readily understood by the layman as well as the professional man.

By John H. Voorhees

New York State College of Agriculture,
Cornell University, Ithaca, N. Y.

But they are not sufficient. As the industry expanded and the forms of lime placed at the disposal of the farmer became more numerous many of the best agriculturists of the country adopted the

THIS ARTICLE was submitted by the author with considerable doubt as to the appropriateness of his suggestions as applied to the agricultural lime industry at this time. It is obviously a long look into the future; yet, after all, it suggests the only feasible solution of the problem of establishing proper and equitable price differentials between those competing commodities, lime, hydrate, pulverized limestone, ground limestone and limestone quarry screenings.

Until this problem of differential is worked out there will continue to be conditions favoring unfair methods of competition.

If scientific men have their way the sale of lime will undoubtedly be placed on such a unit basis ultimately. Are the producers of lime going to aid or hinder progress to this end?—Editor.

term "actual lime" to express the calcium oxide contained in any given form of lime. Calcium oxide is the active part of any form of lime, no matter whether it is associated with water, as in hydrated lime; carbon dioxide, as in ground and pulverized limestone; or whether it is comparatively pure, as in burned lime. It is the chemical radical which represents its power to correct acidity. This is really the only exact basis of comparison so far developed. The weakness of this basis lies in the fact that the availability of the calcium oxide varies with each form of lime in which it occurs. But this does not justify designating the products of the kiln as lime, or those of the crusher as limestone; nor does such a general classification solve the problem and eliminate confusion. Such

a classification is by no means satisfactory. It is not scientific, and the name in any case has no practical significance to the farmer, manufacturer, or producer.

Factors that Determine Value

There are virtually two factors which determine the value of any product of the quarry. They are: first, the amount, percentage (or concentration) of calcium oxide contained in any product; and second, the solubility and availability of this calcium oxide. In other words, the value of any form of lime depends upon the concentration and the degree of availability of the oxides contained. There is no exact analogy in agriculture but a study of agricultural nitrogen reveals some parallels well worth thought and consideration.

The Case of Nitrogenous Fertilizers

There are many materials which carry nitrogen. Each falls into a group according to the form of nitrogen it contains. Strictly speaking, forms of nitrogen has reference to its combination with other chemical elements, just as form of lime has reference to the combination of calcium oxide with other chemical elements. Sometimes, however, the term form is used to indicate rate of solubility, which also measures to some degree availability, since it happens that soluble forms of nitrogen are really more available than the insoluble forms, though neither the soluble nor the insoluble forms show the same rate of availability; that is, a pound of soluble nitrogen is not equally available from whatever source derived, and a pound of insoluble nitrogen from one source may be much more available than a pound from another source.

There are three forms of nitrogen: organic, ammonia and nitrate. Ammonia and nitrate nitrogen are definite chemical compounds and their action in feeding plants is definitely known. Nitrogen in vegetable and animal matter is called "organic," because it is associated with other constituents, as carbon, hydrogen and oxygen, which are necessary to make the substances that constitute animal or vegetable matter. The term "organic," as applied to nitrogen, covers a whole series of substances, and does not indicate uniformity, either in content or quality of the nitrogen, as is the case

with the distinct chemical compounds; hence, associated with the form of nitrogen, when it exists in organic products, must be a knowledge of whether the material contains a very considerable amount of nitrogen, and whether it is likely to be readily changed and thus become available as food for plants.

Similarity to Case of Lime

The action of calcium oxide in burned and hydrated lime is definitely known just as the availability of nitrogen in ammonia and nitrate is. On the other hand, the availability of calcium oxide in ground and pulverized limestone depends upon the hardness of the rock from which it is ground, its association with other materials, and the fineness of division just as the availability of organic nitrogen depends upon the characteristics of the materials from which it is derived. Many studies have been made of the availability of nitrogen in the various materials which contain nitrogen in the organic form as well as of nitrogen in nitrates and the ammonia form, and these studies have done much to answer the practical problem—the one which is of prime importance to the farmer. That is, they have provided a basis whereby the farmer may estimate the relative value or usefulness of these different products, as compared with nitrate, the immediately soluble form, and thus the relative advantage of purchasing the one or the other, at the ruling market prices.

Tables have been prepared of the comparative availability by taking the yield from nitrate nitrogen as 100 and using this as a standard for measuring the yield from the use of other nitrogenous substances. It will be seen then, that the actual availabilities are smaller than the comparative availabilities, since the return from nitrate nitrogen never actually reaches 100 per cent. Furthermore, while practically all of the effect from the application of nitrate or ammonia nitrogen is obtained in the first season, the effect from manure nitrogen or other forms of organic nitrogen is often considerable the second and even the third season.

It is, of course, impossible to fix values because changed conditions of soil, climate, crop and the like may modify them to a considerable extent. But they are a very fair approximation of the actual conditions as they exist in most

soils. The accompanying table gives the results obtained by different investigators under average conditions.

These figures furnish a fair basis for comparing the various materials, when used for the same purpose and under the same conditions. Therefore, if, for example, the increased yield of hay due to an application of nitrate of soda is 1,000 pounds, the yield from blood would be 700, and the yield from cottonseed meal would be 730 pounds, according to the average given in the table.

Result of Years of Development

The work which has led to the development of the above table and the conclusions was only accomplished through years of industrious investigation, and, of course, was easily conducted and logical because nitrogen is used only as a food. It would seem, however, that lime presents very similar possibilities in spite of the fact that it is used primarily to correct acidity and only with certain crops as an important food element. It is practical to measure crop increases from different forms in a scientific manner, and by so doing determine the value of the various forms of lime. At the same time solubility tests of the forms used might be run and the entire system of sales in this manner could be put on a scientific and fair basis.

Some scientists and some lime manufacturers feel that sufficient studies have been made to form a fair basis of comparison, but if this is true the work has not been properly unified because no practical significance has been put upon it and the farmer of today makes only rough estimates.

How Unit Basis Works Out

Nevertheless, enough information exists today to furnish a beginning so necessary in all movements of consequence. In the fertilizer trade nitrogen is sold on what is known as the unit basis, in which case the quotations or prices are based on the unit. A unit means one per cent on the basis of a ton. For example, a unit of nitrate nitrogen means 20 pounds, and a quotation of \$5 a unit would be equivalent to a quotation of 25 cents a pound. This system is without question the most perfect and much superior to the ton basis. It results in the consumer receiving exactly as much as he pays for, and the producer is paid for exactly what he delivers. The

number of units in each material sold is fixed in each case by the chemist.

The adoption of such a system in the lime industry would mark a new era in its history, and even though the effect would be like having the government adopt the metric system, there is no question of the fairness all around.

It would be necessary to make calcium oxide or the active part of lime the basis of the unit. Then a ton of burned lime containing 90 per cent of calcium oxide would contain 90 units, a ton of 70 per cent hydrated lime would contain 70 units, and a ton of ground limestone analyzing 50 per cent of calcium oxide would contain 50 units. The prices would then be fixed according to the solubility of the calcium oxide in the various forms. For example, hydrated lime which is all soluble might be quoted at twenty cents a unit, fine ground limestone at fifteen cents a unit and coarse ground limestone at ten cents a unit. This would allow for the difference in availability in each form and at the same time the farmer would be paying only for the calcium oxide for actual lime which he buys.

It would necessitate a readjustment on the part of the manufacturer and much educational work among the farmer; it would bring to light the fact that there is at present a serious lack of information regarding solubility and availability which may or may not be the same, but at the same time it would prove a fair basis of trade to all.

Indiana Lime Plant Expands

THE LOGANSPOUT STONE AND LIME CO., whose plant is located four miles east of Logansport, Ind., is planning extensive improvements and development of its works. At present the company is busy constructing twenty new homes to be used by employees.

Twenty houses are already built and also one large 17-room hotel. The plant normally employs 150 men, but has considerable difficulty keeping them on the job. It is hoped that the new houses will be an inducement for a permanent labor supply.

Contemplated construction includes the expenditure of \$70,000 to double the plant capacity. At present six vertical lime kilns are in use, but the remodeled plant will have twelve kilns.

At present the plant is not able to supply material fast enough to meet the demands made upon it for lime and crushed limestone.

It is stated that after the present improvements are completed and the industry has been so adjusted as to absorb the 100 per cent increase in production, the next step will be the addition of a portland cement plant. Peter Martin is president of the company.

COMPARATIVE AVAILABILITY OF DIFFERENT NITROGENOUS SUBSTANCES

Authority	Wagner	Dorsh	Johnson	Voorhees	Wagner	Average
Nitrate of Soda.....	100	100	100	100	100	100
Sulfate of Ammonia.....	90	76	70	83	86	86
Cottonseed Meal.....	70	77	70	65	73	73
Dried Blood.....	70	72	65	65	70	70
Hoof Meal.....	70	70	65	65	68	68
Dried Fish.....	68	68	60	65	67	67
Tankage.....	60	65	53	53	64	64
Meat Meal.....	60	65	53	53	59	59
Bone Meal.....	30	2 to 30	25	25	59	59
Wool Waste.....	20	2 to 30	15	15	27	27
Leather Waste.....	20	2 to 30	15	15	17	17

Random Comments on the Issues of the Day

At the recent meeting of the Ohio Sand and Gravel Producers' Association the following typical record of experience was submitted by a typical pit operator:

Liability

Insurance

Review of rates paid to the Industrial Commission of Ohio for employers' liability insurance:

May, 1913-November, 1914.....	\$2.03
November, 1914-May, 1916.....	1.90
May, 1916-November, 1917.....	2.10
November, 1917-November, 1918.....	3.00
November, 1918-November, 1919.....	3.45
November, 1919-May, 1920.....	4.45

No accidents have occurred at this plant. The risk has not cost the state a penny in claims. The average wage has more than doubled since 1913. This company has paid a total of nearly \$2,000 to the state fund.

We have heard exactly the same kind of an argument from quarry men in Ohio, both limestone and silica rock. This is the direct result of a state monopoly in industrial insurance. Every operator in the state is compelled by law to cast his lot with every other operator under his classification, whether he wishes it or not. The state has never inspected the plants in these industries. It makes no attempt to separate the legitimate operator from the fly-by-night type.

If mutual or old line stock companies were allowed to do business the operator could insure with a company that selected its risks and inspected the plants and gave value received for premiums paid. State insurance is all right in theory, but like everything else the state operates, it suffers from a host of political ills. If the state claims it can give insurance at a bargain, let it prove so in competition with men who know something about the insurance business. The sand and gravel and crushed-stone operators of Ohio ought to be strong enough to get justice in their own state; if they are not, it is a worthy object to work for.

The most important events in the rock products industries in the next two weeks will be the annual conventions of the National Crushed Stone Association, at Louisville, Ky., February 9, 10, 11, and of the National Association of Sand and Gravel Producers, at Chicago, February 11, 12 and 13.

The sand and gravel producers' convention will be preceded on February 9 and 10 by the annual convention of the National Builders' Supply Association, in which many producers will be equally interested. At the same time the crushed-stone men are meeting in Louisville, the American Road Builders' Association will be in session there also.

On February 18 and 19 the Associated General Contractors of America will hold an open convention and

national conference on construction, in Chicago. On March 24 and 25 the National Federation of the Building Industries will hold an open meeting in Chicago. At both these conventions the building material producer has an opportunity to be seen, heard, understood and appreciated.

To quote from a little poem on A. P. Sandles' Ohio Macadam Association's banquet menu:

He who has something to sell
And goes and yells it down a well,
Is not so likely to collar the dollars
As he who climbs a tree and hollers.

The experience of E. Guy Sutton, Secretary of the National Association of Sand and Gravel Producers, at Washington, brings out the fact that "Open-Top" Not it is highly desirable that the constant reference to all open-top railway cars as *coal* cars is something worth the attention of all shippers of mineral aggregate.

There is going to be a serious shortage of open-top equipment for some time to come, and it is going to be, to a considerable extent, a matching of wits and strength to see what industries get a fair share of available equipment. The coal-mine operators have a tremendous advantage, not only in organization, but in the popular comprehension of their industry.

Probably it isn't worth while at this stage of the game to attempt to impress on the public mind that the mineral aggregate industry is a real industry and as such is as justly entitled to transportation service as any other. That must, of necessity, be a long, slow process of education. But all mineral aggregate producers can help a lot if in their dealings and correspondence with public authorities and railway officials they insist on the use of the term "open-top" car instead of "coal" car.

Two recent decisions of the Interstate Commerce Commission on sand and gravel and crushed-stone freight rates are of considerable interest to producers. These are the cases instituted by the State Highway Department of New York against the West Shore R. R. Co.

The most important points established were that a rate of \$1.40 per ton for a crushed-stone haul of 60 to 70 miles over two lines was considered just and reasonable, and that a sand and gravel rate of \$1.60 per ton for a three-line haul of 90 to 100 miles was O. K.

No considerable amount of these materials moves over these routes, at the rates named, under ordinary conditions and producers were not interested.

High Prices Threaten Eastern Building Material Market

A Tremendous Year's Building Program May Be Turned Into a Mediocre One by Prohibitive Prices

GREATER STABILITY of cost to the consumer of building materials and equipments is the price now being exacted by financial interests when considering applications for public loans, says the Dow Service Daily Building Report.

The situation is becoming serious. Some interests term the outlook critical and have already taken forward positions to try to stem the price movement in its heedless course upward. It is time for strong minds and level heads to step in and save a situation that now begins to assume threatening aspects toward a year's building program that has tremendous possibilities, but which may be easily turned into one of only mediocre volume. Certain powerful influences have already deferred decisions on pending applications for new building projects of great importance in New York until after the new freight rates are announced in the expectation that that event will mark the practical close of the most spectacular rise in building material and construction costs that the country has ever known.

Dealers, manufacturers, contractors and especially the architects, are a unit in protesting any further advancing of building material prices upon the simple plea that if prices go further upward building will be greatly curtailed. Those whose position in the building world is close enough to the source of most building projects have realized for some time that the price situation regarding building materials and construction costs has reached a point beyond which it is actually dangerous to go.

It is even generally known in the building trades that the banks or financial interests have already set a positive deadline beyond which they will not go. It cannot be any longer denied that there is a certain hesitation in financial circles regarding the immediate future and that the forthcoming presidential campaign is a good time to apply some counteracting influence against the now worn-out theory that people will pay any price and put up with any inconvenience in order to get what they want. The plain facts in the present building situation as applied to building finance is that there is now a well-defined point beyond which building finance will not be provided and that that point will have been

reached when the new freight rates are announced.

Cement at Stabilized Price

Upon inquiry in the cement industry and among experienced dealers it would seem that some of the leading minds among the manufacturers and distributors are making an earnest endeavor to stabilize portland cement prices. This industry feels, almost to a man, that all forms of building and other construction work should be encouraged. The broad-minded men of the industry are looking two, three and five years ahead and are spending vast sums of money to educate the people into the economical use of and new uses for cement. Provision has already been made for tremendous volumes of this material. December in portland cement shipments into this market was greater than any December in ten years. Shipments were 80 per cent over December of 1918 and 70 per cent over December of 1917. As for production, more than 3,000,000 bbls. were made in December over and above either 1919 or 1918. The stock on hand at the end of the year was a million bbls. less than in 1918. There is today less stock of cement on hand for use in this market than there has been in any late year.

Here is shown the result of stabilization of price. The cement industry has a peculiarly strong record for evenness of prices covering the recent critical period that the country has passed through. There seems to be a feeling among owners, contractors and dealers that there will be a shortage of cement during 1920 or some advance in price, or both. The cement interests are already arranging for tremendous production, striving to reach the total of 46,000,000 bbls. for the two zones supplying this district, whereas 30,000,000 is the greatest volume ever produced for New York consumption. As for this coming year there is actually the ability and a will to over-produce if restrictions are not placed on the movement of coal, limestone, empty cars and on the finished products.

Today's building material price list shows still further advances in some lines, despite the attitude of banking interests against this constantly upward tendency. All prices on plaster, neat or sanded, were withdrawn at the week-end and advances of \$1 and 50 cents in both classifications were reported.

Phosphate Shipments Increase in Spite of Difficulties

TAMPA, FLA.—Only in the last two or three months have phosphate shipments through Tampa by water begun to get back to normal since the war, but they have jumped tremendously this winter and prospects are bright for continued increasing activity.

Statistics show more phosphate has been shipped through the port of Tampa and Port Tampa during October, November and December than during the nine preceding months of the year 1919. The total for the year amounts to something like 75 per cent more than the total for 1918, exceeding it by about 130,000 long tons.

During the world war all available bottoms were requisitioned for war purposes. Only last spring did ships begin to return to peace time service, and at just that time the strike was inaugurated through the phosphate mining districts of Florida, nipping in the bud for several months the promising growth of shipments, so that during the second and third quarter of 1919 shipments were slightly less than during the same periods of 1918.

It may be conservatively estimated that had there been no strike the phosphate movement through Tampa would have been more than double what it actually has been since the strike began. The brief time that has elapsed since the labor difficulties were settled has been enough to show plainly what might have been during those months. In August only 4,986 tons were shipped out, and only 8,765 in the next month. In October the amount stepped up to 30,555—almost as much as the total for the third quarter—and in November the figures were 55,568 tons, the largest of any month during the last three years. Last month's shipments were 9,089 tons heavier than the November total, or 64,657 tons.

The latest estimate of the United States Geological Survey places the available tonnage of high-grade phosphate rock in this country at 5,712,082,000 tons, an amount sufficient to last at present consumption for 2,000 years.

November Cement Exports

WASHINGTON, D. C.—Cement to the value of nearly three-quarters of a million dollars was exported during the month of November, according to statistics just secured by the Washington Bureau of ROCK PRODUCTS from the Department of Commerce. While our imports during the month amounted to only 35,600 lbs., valued at \$399, our exports totaled 238,783 bbls., worth \$716,874, divided among more than forty foreign countries, of which the most important were Cuba, Brazil and Peru.

Repair Shop Organization and Equipment

Importance of This Department of Quarry and Gravel Plant Operation Well Demonstrated in Last Two Years

TO KEEP PRODUCTION up to its best, the mechanical equipment of a plant must be efficient and be kept in first-class working order; wear and tear and breaks occur continually in quarry working, and the repair shop is by itself a very important department.

Location of the Repair Shop

The layout of the ground, the available space and the importance of the enterprise will decide where the repair shop should be located. One side of the main entrance of the plant is usually selected, for several reasons: The place is generally already leveled, no more excavation will be made there, it is a few steps from the main road or track, and supplies can be readily delivered to the warehouse, and the shop, new machinery can be received, erected there and sent to the work with the repaired equipment.

The Building

Like the blacksmith and carpenter shop, to lessen the danger of fire, wooden frame with walls and roof of corrugated iron, has proven the best, it is quickly erected and has a neat appearance, it is no more expensive than the all-wood building with roofing paper on the outside; they take lower insurance rates and will outlast the undertaking.

In some localities where the winter is severe or where the building material is relatively cheap, and the character of the industry is a lasting one, shops are built of brick or concrete, but not

By Chas. Labbe

Mechanical Engineer
Johnnie, Nevada

as a rule. Always provide for as many windows as you possibly can; very seldom one sees a well lighted shop. If the building is large and the machine tools close to the walls, they get and often cut off most of the light needed by the workmen on the floor or center; a skylight is important for good lighting and ventilation in any shop.

The floor is generally made of planking at least two inches thick; it is easier to stand on than concrete, with the advantage that a damaged plank can be repaired or replaced without disturbing the other, but close to a forge, as in the blacksmith shop, a well-tamped hard soil floor is preferable.

The track from the quarry and crushing plant must extend to the blacksmith and repair shops, with switches and sidetracks as needed. The top of the rails in the shop must be slightly lower than the floor to avoid accidents to men stepping and sliding on wet or oily rails.

Placing the Machine Tools

The location of the machine tools in the shop is the first item to be considered, to save the many unnecessary steps by a suitable arrangement. The size and number of units is to be governed by the kind and importance of

the works. Fig. 1 represents the most convenient layout of the shops.

The motive power, unless taken from the main engine, is usually an electric motor or a gas engine. It must be installed in a corner away from dust, sparks and flying chips, and not be in the way or passage of workmen or material. An independent power unit is preferable because it permits the operation of the repair shop while the main power plant is stopped for any reason. Then also the shop had better be a little away from the crushing plant on account of the dust.

An electric motor can be set on a platform above the floor, but a gas engine must be set on a concrete foundation, leaving at least 30 in. between the walls and the engine, to permit walking around it for inspection and repair.

The line shaft is placed 8 to 10 ft. overhead, with bracket hangers fastened to the wall posts, or to the ceiling cross-pieces with plain boxes or drop hangers. Select ring oiler bearings, they reduce the maintenance and attention to the minimum.

The lathe is placed close and parallel to the wall. The type of lathe to select is a regular type, step-cone, belt-drive, quick-change for threading, swinging not less than 14 in. The bed must be long enough to take between centers a screen or crusher shaft. Ready-made raising blocks must be included to raise the head stock, the tool post or compound rest and the tail stock to permit

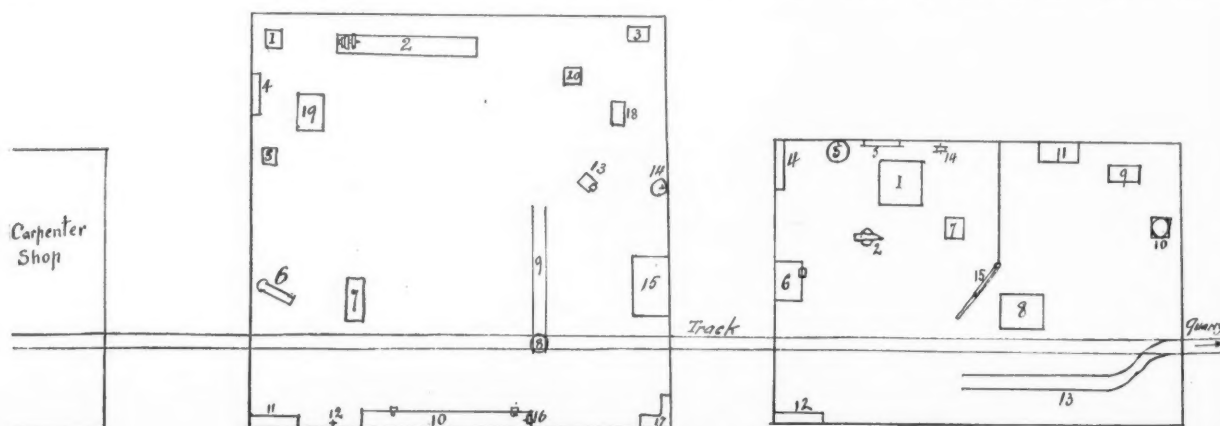


Fig. 1. Typical layout of repair shop buildings and machine tools

taking work of a larger diameter than the lathe itself was originally designed for, to do such work as the boring out of car wheels or screen spiders, the turning down of the wheels of a medium size locomotive and the truing up of roll shells. Two steady rests are necessary, one from nothing up to 4 in., and one from 4 in. to 12 or 14 in. A taper attachment is often needed and will pay for itself. If the shop is not equipped with a shaper or a milling machine, a milling attachment ought to be provided

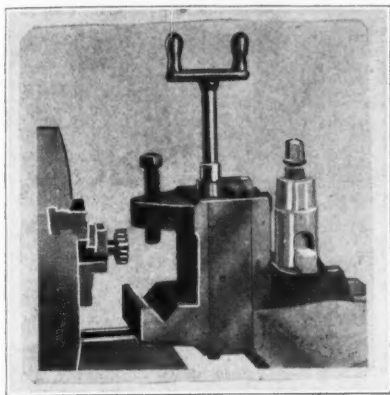


Fig. 2. Milling attachment for lathe

for the lathe. This attachment (Fig. 2) is held fast in the tool post, can be put on or taken off in a few seconds, can be moved back and forth, and up and down at will. A milling cutter is clamped in the three-jaw chuck, this makes key-way cutting, grooving and slotting easy and accurate.

The tool of next importance is the drill press, it must be installed within a short distance of the lathe, because very often the drilling is done by helpers who require the attention of the lathe man for the correct speed and the sharpening of drills. In a crushing plant, where a large piece may be brought to the drill press and the next piece of work may be some of the lightest parts of the engine of a motor truck, it is advisable to have a medium size bench drill for all the work up to $\frac{5}{8}$ in., and a radial post drill (Fig. 3) for the larger work. If the general work is of medium size, a regular upright drill is sufficient. For the other work either a ratchet, electric or pneumatic drill is used. The drills, chucks, reamers, taps and dies are kept on shelves between the lathe and the drill press for the easy reach of both operators. The large drill press is installed near the door and the track to avoid taking a large piece far into the shop, disturbing everything and everybody.

The Bench

The machinist bench is made of planking about $2\frac{1}{2}$ in. thick, and should be

not less than 24 in. wide. To protect the wood it is covered with light sheet iron. At one end of the bench is done the rock drill repairing. Here should be a locker for containing the overhauled repair parts. The compressed air pipe must come to that part of the bench with hose connections for the testing of air drills, also the connection for the portable pneumatic metal drill.

At the other end of the bench a pipe vise should be installed, and on shelves nearby are kept the pipe dies, wrenches, and the fittings still in serviceable condition, that have been already used or otherwise checked off from the warehouse. At least two regular machinist vises must be provided, also drawers for files, chisels and other small tools.

The Oxyweld Outfit

A natural adjunct of the machine shop is the oxyweld outfit. It must be provided with a strong bench, overlaid by a sheet iron $\frac{1}{4}$ to $\frac{3}{8}$ in. thick. This permits laying out work which is still hot, and a bench which will stand some light hammering. The floor in that section of the shop must be tamped soil, to avoid fire risks and permit the building of a fireplace with bricks or pieces of iron plate for the heating up of broken pieces of machinery.

Emery Wheel and Hacksaw

The emery wheel stand is erected in

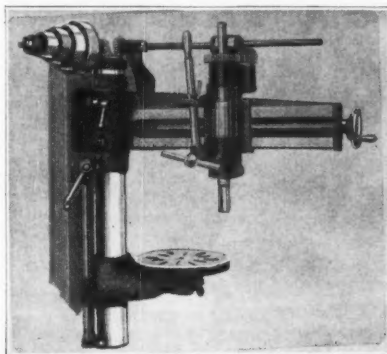


Fig. 3. Radial post drill



Oxy-acetylene for trimming a manganese-steel plate for crusher-pit lining

the corner back of the lathe, but not in line with it, because from the lathe chuck to the wall at the end of the lathe bed ought to be at least 20 ft. to permit the taking on the lathe of such long pieces as a whole length of pipe or shafting. A power hacksaw is a good investment, and if the importance of the shop requires it, a combination bolt and pipe threading machine should be added.

Crane

The shop should be equipped with a

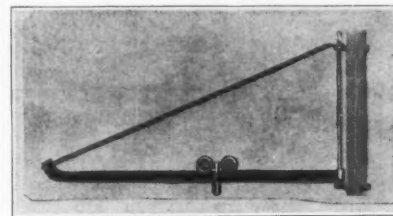


Fig. 4. I-beam traveler

plain I-beam traveler which can be used for taking any heavy piece off a car or truck and for transferring it to any place in the shop. A common chain block can be used for lifting. In case of an I-beam traveler, the line shaft is set with brackets on the wall, thus giving unobstructed operation to the traveler. If the I-beam crane cannot be installed, at least a derrick crane (Fig. 4) should be placed at the most convenient point.

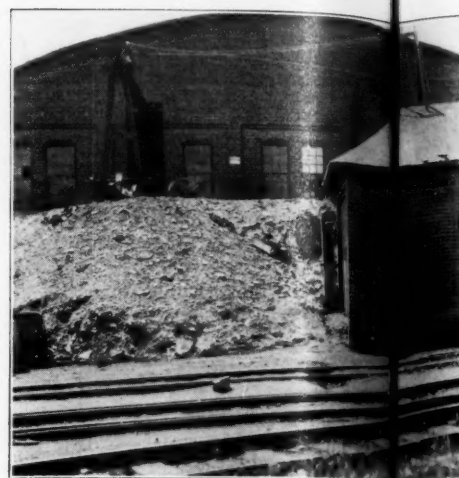
A very useful tool is a press for the removing of large gears, pulleys, sprockets, couplings, etc. A small portable hydraulic press is the best, but if found too expensive, a hydraulic jack will answer the purpose. The frame should be made of channel iron of a size to suit the work. Chains are not reliable unless unusually strong.

Other Appliances

If motor trucks are used and repaired, a pit 3 ft. deep must be sunk in the floor in close proximity of a door, so that a



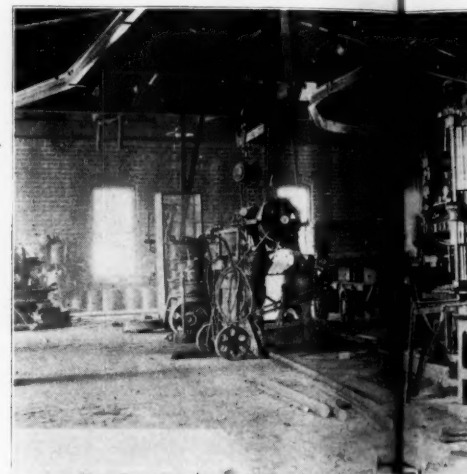
Typical quarry repair shop—Bessimer Limestone & Cement Co., Hillsville, Penn.



Oil storage house in foreground—shop



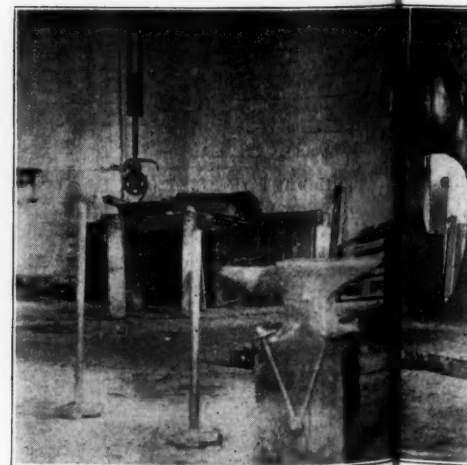
Another interior view of Bessimer Limestone Co. shops



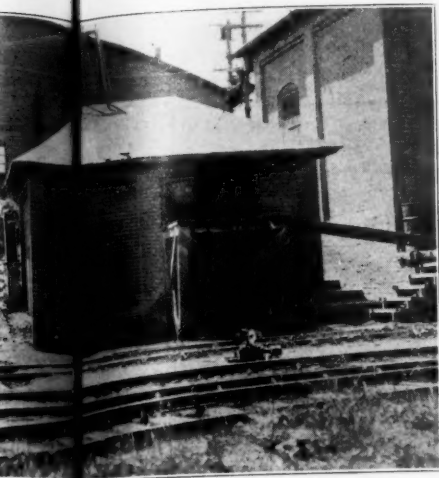
Note overhead track for traveling crane



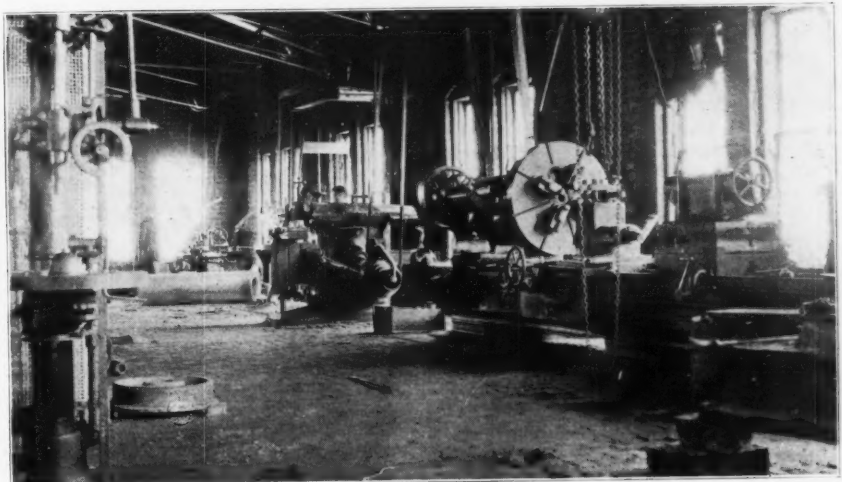
Forge shop of the Bessimer Limestone Co., showing steam hammer



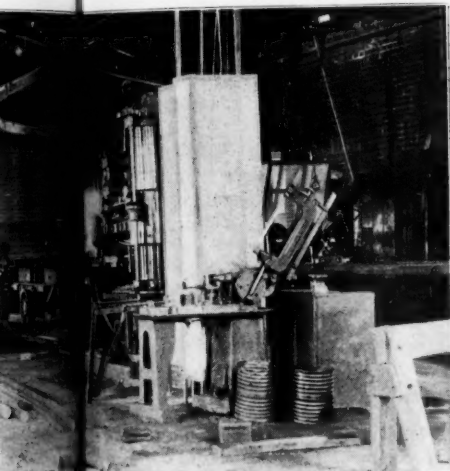
Another view of the forge shop and



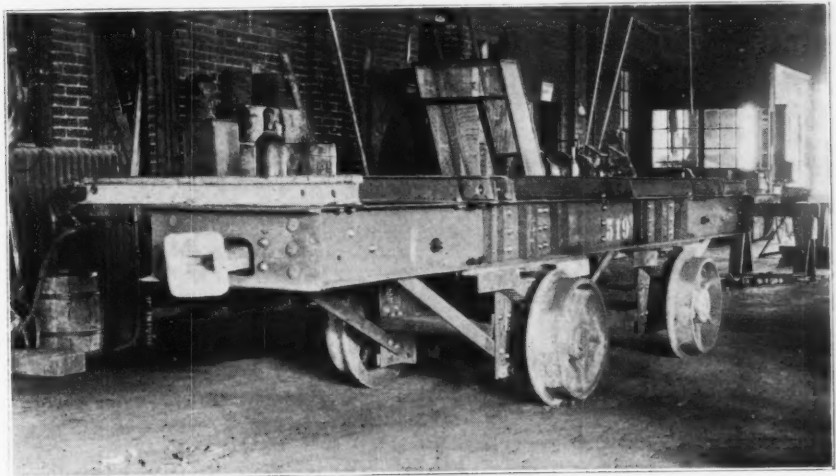
se in foreground—shop in background



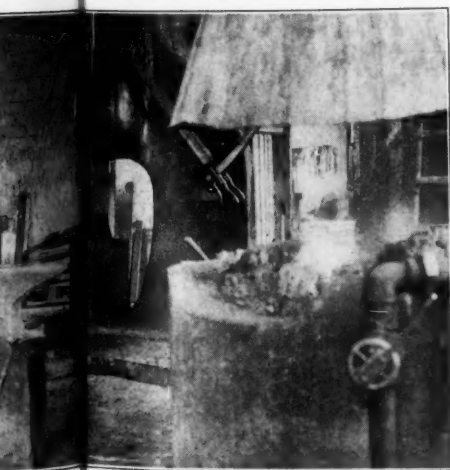
Interior of Bessimer Limestone Co. shop, showing machinery layout



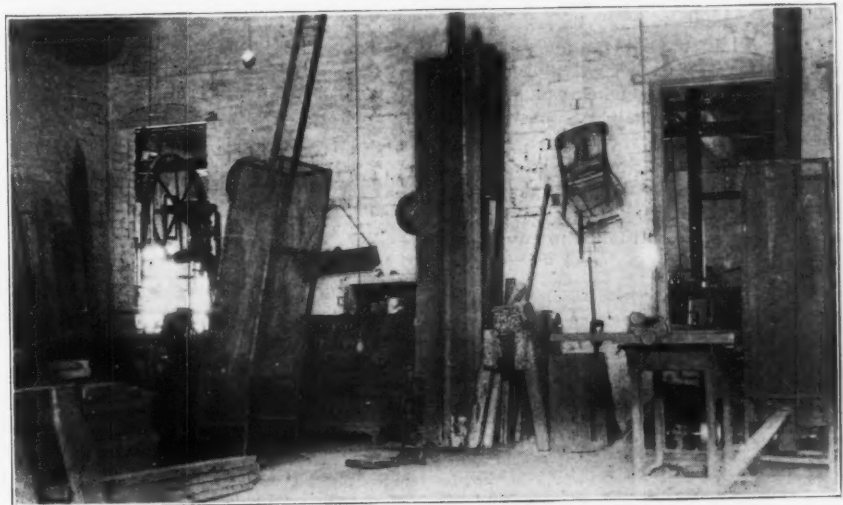
ack for traveling crane—car repair shop



Example of work done in the Bessimer Limestone Co. shops—cars entirely built



of the forge shop and trip hammer



Carpenter shop, showing up-to-date methods of safeguarding machinery

their own repairs, as usually they will have a makeshift, which often results in a bad break. And do not let them do their repairing in the shop.

We all have heard of the profit-sharing and bonus plan for production, but I doubt if the economist has yet found any practicable plan for the repair shop. The work is so varied that it will be hard to follow the method used in the production end of the plant. So far it has been my policy to employ competent men and to furnish them with the best tools. But in keeping abreast with the times we may find that there is room for improvement.

Rock Product Fertilizers to the Front!

THE BRIEF NOTE in our issue of January 3, relative to rock phosphate at last coming to its own, has brought a letter from W. S. Knowlton of Boston, Mass., enclosing one to him from a practical farmer in old Yankee Connecticut. This letter reads in part as follows:

CONNECTICUT AGRICULTURAL COLLEGE
W. M. ESTEN
DEPARTMENT OF BACTERIOLOGY AND METEOROLOGY
Storrs, Ct., Jan. 1, 1920.

Mr. W. S. Knowlton,
Boston, Mass.

Dear Sir:

I am carrying on some field experiments on economic crop production. If you can make use of some of my results, would be pleased to send them to you. I am using rock phosphate and limestone for minerals and using bacteria to capture the nitrogen. I am getting results that seem too good to be true. Soon as I commenced to investigate in soil science it did not take me long to find out the ruinous results in the use of commercial fertilizers on soils.

My scheme is to find out just what a given soil lacks; then supply that deficient element from the cheapest source. For example, the field I am working on had a deficiency of phosphorus of 1,000 pounds. When this was supplied the crops grew as if by magic. The next deficiency was lime and the next nitrogen. Crops produced after starting these experiments in 1916 are astonishing.

I am now selling red kidney beans at 12 cents a pound and raised a crop of 36 bushels to the acre. The 2,160 lbs. of beans brings \$259.20 per acre. The past season was able to grow 27 tons of mangels per acre, which were sold for \$19 per ton. An acre of them brought \$513.

Am selling popcorn at 12 cts. a pound. My yield of popcorn was 100 bushels to the acre; about 90 bushels were marketable and is bringing \$604.80 per acre.

The clover yield was 5 tons to the acre and winter wheat 76 bushels to the acre. All this is being accomplished on an abandoned piece of land which had not produced a profitable crop in 25 years.

Yours truly,
(Signed) W. M. ESTEN.

If this means anything it means that the day of the lime and limestone pro-

ducer, the rock phosphate producer, the gypsum producer is at hand.

Code for a Live Association

Some Truisms That Need Constant Reiteration

TO BEGIN WITH, there are associations and associations. Some, managed by live wires, are increasing the prosperity of their members, others exist in name only. One of the best codes the editor has ever seen to explain or bring about success in association work is that prepared by George Wilson-Jones, secretary of the Illinois Lumber and Builders' Supply Dealers' Association, which in part reads as follows:

"If the member knew the importance of the organization as the secretary has it brought to his attention each day, he would not hesitate about sending his dues; in fact he would insist on paying double.

"A thing worth doing at all is worth doing well.' This adage applies to the association just as much as to our individual lives.

"All the detail work that can be done by hired help should be so done, and the secretary's entire time should be devoted to promotion of the organization and attention to the needs of the members.

"The member should consider his association dues as much a part of his business as salary, cartage, insurance, taxes, and other overhead expenses.

"When the member realizes it is HIS association and not the private business of the secretary, there is no lack of interest.

Let 'Em Kick

"The best member is the member who kicks. A kick indicates interest. The secretary profits more by kicks than commendation, for a kick points out the way for an improvement.

"The individual member has exactly as much influence as the officers and directors. They are merely the machinery by which the wishes of the members are put into operation.

"The worst type of member is the one who pays his dues then forgets his obligation to his fellow members.

"The development of the fraternal spirit would increase the value of membership immensely.

Members Should Bring in Members

"The member should make it his special duty to see to it that there are no non-members in his vicinity.

"The non-member is dragging his feet and slowing up the progress of the industry. The member serves the non-member, himself and his fellow members by securing said non-member's membership.

"Each new member adds to the financial strength, enhances the influence, increases the importance, puts more punch into the work, and assists materially in getting results.

"No other investment a dealer makes pays such big dividends as association membership.

"Ask the non-member if he would welcome the disbanding of the association. Put it up to him that his non-membership is interpreted by hostile influences as a vote for disbandment.

"Give the association 100 per cent membership, ample financial backing, necessary clerical help, and the results will astonish the most skeptical.

Publicity Essential

"No matter how efficient our association may be, unless we have funds necessary to advertise this fact, we will die of dry rot. An association thrives on energy exactly as your own business does.

"Treat your association as you treat your business and you will get the same results.

"No man leaves his business entirely to an employee. Why then leave the association entirely to the secretary?

"Your employee respects you in proportion to your own activity as the proprietor. Your association secretary regards the association in the same way. Give the secretary a bunch of lively members, and he will hustle his head off to keep up the pace they set.

"We are living in a changing time. What was good business a score of years ago leads but to ruin today. The man who will survive is the man who grasps the opportunities each day offers. Unite your grasp into a strong organization and you will get what you are entitled to. You must help yourself for no one will lift you over the muddy places in the road.

Everybody Is Organized

"The farmer realizes the value of organization. The laborer realizes the value of organization. The school teacher realizes the value of organization. Organization is what turned an aggregate of untrained men into the splendid army that pushed the war to a glorious victory. 'United we stand, divided we fall.' That statement was true when first uttered. It is much more true now.

"Without thorough organization we get only what is left over. With thorough organization, we get what we are entitled to."



Reducing Liability Insurance Rates

Exact Records of Accident Statistics Highly Essential

THE IMPORTANCE OF ACCIDENT STATISTICS as a factor in operating expenses is becoming manifest and as a result laws have been enacted in many states creating industrial-accident compensation commissions. The majority of these commissions require a report on all accidents that injure a workman sufficiently to cause any loss of time. There is, however, a lack of uniformity in reporting accidents and a still less agreement in tabulation methods in published reports.

Exact records of labor and accidents are necessary; these should include the number of men on the pay roll; the actual days worked for which wages are paid; days and wages lost by reason of accidents, as well as days off duty by other causes. A classification of employees by occupation is desirable by reason of the varying occupational hazards. These records should embody all of the information available, concerning each accident as to when, where and how it occurred, if the best results are to be obtained. They should state whether the accident occurred in the quarry at the working place, or on the surface, as without such information it is impossible to thoroughly diagnose the causes and prescribe remedies for their prevention. If the accident occurred on a hoist, it is not enough to know that a man fell from the hoist and was killed. Why did he fall? Who was to blame? Was the equipment defective? Could the accident have been avoided? It is the answer to these questions that should be recorded in accident statistics.

So long as accidents occur, it is necessary for the operator to keep correct and detailed records. He should study intelligently every accident from all angles. If the accident was preventable, he should install a device that will prevent its recurrence. At the close of the year he should take an inventory of his records with the object of finding out what and who was to blame for each accident. Having found out the principal causes,

By A. H. Fay

Mining Engineer, U. S. Bureau of Mines

he should see that proper remedies are then applied, for example: should it be known that a certain exposed electric wire has electrocuted four or five men during the year, the remedy is not to supply additional men, but to devise a guard for the wire, or install another type for this particular section of the plant.

If human beings were perfect and it were possible to devise perfect machinery, there would be no accidents to record. While someone has a lapse of memory for an instant, a haulage motor that is under human control moves a few inches too far and crushes a man to death. Another man did not look where he was stepping and as a result punctured his foot with a nail. The nail should have been removed to prevent the thoughtless from stepping on it. Mistakes are made by managers as well as by the employees; both are often careless; and both are responsible for mechanical equipment, the employer in providing it and the employee in keeping it in proper condition when installed and turned over to him to operate.

There are a few operators who have not awakened to the need of accident statistics and therefore feel, when asked for certain information concerning accidents to their employees, that it is a sort of inquisition being forced upon them to disclose their private business. Far be it from this. It is for their benefit as well as for the welfare of their employees. Whatever helps human beings in the matter of health and comfort will pay good dividends to the man who provides these essentials. Sick and crippled employees in the hospital or at home are a burden to themselves and their families, the community and the state, without any benefit whatever to their employers.

Insurance Rates

If the operators are desirous of obtaining a lower insurance rate than they are now paying, it can be obtained only by keeping correct records of labor and all accidents, and having available sufficient proof to show that the accidents at certain plants are not so high as they are at other plants of a similar nature. The absence of records has a tendency to hold the rates higher than perhaps they should be.

Comparison of Accident Rates.

Comparing accidents on the basis of the number of men on the pay roll is not strictly correct, although it may answer for all comparative purposes. By reason of the labor turnover the number on the pay roll is considerably higher than the number actually at work, thus having a tendency to show in reality a lower accident record than would otherwise appear. Inasmuch as all plants do not have the same number of working hours per day or per year, it would assist in the matter of comparing accident records and rates if the operators would keep records of the time actually worked by all employees. In other words, the plant which operates on the basis of 10 hours per day should have a greater accident hazard than a similar one operating on an 8-hour basis, and a comparison of the two without a time adjustment is not fair to either the one or the other. The company's pay-roll in every case, except in contract labor, shows the number of hours for which wages are paid during the day, week, month, or year. Taking the number of hours as a basis upon which to calculate the accident frequency, it is an easy matter to arrive at the number of 3,000-hour or 2,000-hour workers as the case may be, by which true comparisons may be made.

Publicity

Whenever an operator finds that he has discovered some means of preventing accidents in certain branches of his

work, it would be serving his fellow operators a good turn if he would in some way let his ideas be known to them. Any exchange of ideas with reference to safety work among the operators of a district or community should result in much good being accomplished toward the reduction of accidents.

Blasting Accidents from Missed Holes

ACCIDENTS CAUSED BY MISSED HOLES are often avoidable and attention to the details of such accidents should make it easier to avoid them in the future. The following report of an accident, occurring in some open-cut steam shovel work, in which two men were killed, should serve as a warning in operations where any uncertainty exists about a missed hole and where black powder is being used. The accident referred to occurred in Utah.

The height of the face at the cut was about 30 ft. Twenty 1½-in. vertical holes 30 ft. deep were drilled at the time and chambered with about 50 sticks of 1½-in. dynamite. After this, they were loaded with 8 or 10 cans of black powder in each hole, and exploded with an electric battery. The debris was being removed by a large steam shovel; at the time of the accident the dipper was working on the right side of the cut, the boom being turned to the right. The engineers and cranemen were in their places, both being on the right-hand side towards the shot. When the dipper was just starting at the grade, to take a load, a flash was seen, followed by an explosion a few seconds later. Most of the men ran under the shovel, two or three did not quite get out of danger and were slightly hurt. The positions of the engineer and craneman were such that there was no chance for them to escape. The engineer's body was found lying on the cab floor, and the craneman's body was found between the cab and boom beam, both being killed by the fall of blasted rock.

This seems to be a clear case of a missed hole, exploded by sparks from the steel dipper. One of the pitmen said they saw a flash and all ran for the shovel.

The formation at the surface is full of cracks and crevices. Also, the springing of the holes would naturally open cracks. The explanation of the cause of the accident is that, when loading the black powder, some of the powder ran down one or more of these cracks and filled a small opening not far from the loaded hole; at the same time, leaving a trail of powder from one point to the other. This explains the lapse of time between flash and blast. Sparks from the dipper just

as it reached the powder caused the trouble.

The foreman and the pitmen all say they often have seen unexploded black powder in small quantities among the rocks, but that no flash has been seen before; also, that this was the first missed hole they have known of, though most of these men have been on the job only a month or two.

This accident emphasizes the necessity of careful search of any place where blasting has been done for evidence of missed hole. In cases where black powder is used the injection of water would serve as an effective preventive of an explosion.—U. S. Bureau of Mines, Reports of Investigations.

The Belt Hazard

EVEN if you have had no such accidents at your plant, do not lose sight of the fact that belt accidents of a serious nature may occur at any moment unless your men are constantly on their guard for the danger in connection with belts.

A member company of the Portland Cement Association recently displayed on its plant bulletin boards the bulletin reproduced with this article. It is home-made, gives the names of those injured and has the

DANGERS OF BELTS



Sept. 26, 1919. Jos. Magyar, roll tender. Throwing off belt with bar. The bar got between belt and pulley, throwing him from the platform to the floor. Laceration of scalp, contusions of left leg. Time lost—14 days.

Oct. 29, 1919. G. Rossi, 2nd griffin miller. Removing belt from 17 griffin mill with a bar. The belt broke. Laceration of jaw and contusion of hand. Time lost—10 days.

THE ABOVE MEN WERE LUCKY, MANY MEN HAVE BEEN KILLED THAT WAY.

When you are about to throw off a belt or out on a belt while machinery is at full speed, remember what you have read on this bulletin.

EVERY ACCIDENT IS AN INDICATION THAT SOMETHING IS WRONG, EITHER WITH MEN, METHODS OR MACHINERY.

personal touch and home flavor which make bulletins of this nature of particular interest to your workmen.

Contrary to a common opinion, the greatest danger in connection with belts, particularly belts of the size used at cement plants, does not lie in lack of guards or the breaking of the belts. Many more accidents, by far, occur in connection with the manipulation of the belts by the workmen. In one accident an assistant superintendent was killed due to careless manipulation of a belt. He stood on the foundation of a Bradley mill, inside the loop of a belt, and had on a raincoat. The mill not being in operation, he decided to jerk the motor a

little in order to locate the keyway in the shaft. This was done, and although the pulley on the mill made less than one revolution, he was caught between it and the belt, which was 24 inches wide, and instantly killed.

Six other accidents from August 20 to October 30 are described, as caused by attempts to throw belts or in applying dressing to them. One of these—attempt to throw a Griffin-mill belt with a stick—resulted fatally. Three attempts to apply dressing to moving belts caused losses of from 14 to 42 days each.—From the "Accident-Prevention Bulletin" of the Portland Cement Association.

Thirty Miles of Graves in 1919

THIRTY MILES of graves were filled with the dead from industrial and public accidents in the United States during 1919—eighty thousand men, women and children sacrificed without cause. Such a situation demands serious attention—especially when it is realized that over 75 per cent of these deaths were preventable.

The story of 1919 is only a repetition of preceding years. It is this annual wastage of human beings and the resultant heavy cost to industry that has called into existence the National Safety Council, a purely co-operative, non-profit making association of nearly 4,000 of the largest industrial concerns in the country—created primarily because organized accident prevention in industry has become an absolute essential.

At its headquarters the Council maintains the most complete accident prevention library in the world. Its service to members includes a weekly unit of educational poster material, a monthly publication of safe practices in industrial operation and processes, the preparation of lessons for schools for foremen, chauffeurs, and safety inspectors; and the maintenance of a consulting department through its staff of engineers.

Here is a service which cannot be bought. As a member, you help to enlarge the scope of the Council's effort, and in return you receive all of the benefits which accrue from its activities.

Write today for information. Address the Business Division. You will not incur the slightest obligation.

NATIONAL SAFETY COUNCIL
Co-Operative Non-Commercial

National Sand and Gravel Convention Program Promises Live Meeting

Concrete Roads—Sand and Gravel Specifications—Transportation Problem—Pumping Sand and Gravel—Industrial Relations—All Find Prominent Places

THE ANNOUNCEMENT of the program of the annual convention of the National Association of Sand and Gravel Producers at the Sherman Hotel, Chicago, February 11, 12 and 13, leaves no doubt of a meeting which no live producer can afford to stay away from.

On Wednesday morning, February 11, there will be an address of welcome by Ben Stone, business manager of the Illinois Sand and Gravel Producers Association, which every one will want to hear. Ben Stone is a national figure in the sand and gravel industry, and will have something worth while to say. The response by President Harry Donnelly, of the Ohio Ballast Co., Cincinnati, Ohio, is sure to be a star feature.

The nominating committee, consisting of R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Iowa; J. K. Jensen, Janesville Sand & Gravel Co., Janesville, Wis.; J. H. Allen, Lincoln Sand & Gravel Co., Lincoln, Neb.; Jos. R. McGaw, Ohio River Sand Co., Pittsburgh, Pa., and J. M. Settle, Ohio River Sand Co., Louisville, Ky., will make an early report.

One of the chief features of the morning program will be an address on "Concrete Roads—Past, Present and Future," by H. S. Earle, Genesee Gravel Co., Detroit, Mich., who was Michigan's first state highway commissioner, and may soon be Michigan's governor.

The afternoon session on Wednesday will be opened with a paper on "Tests of Sand and Gravel Concrete," by Dr. W. K. Hatt, of Purdue University, president of the American Concrete Institute. Discussion will be led by R. C. Yeoman, engineer of the association. The second paper of the session will be by Prof. T. R. Agg of Iowa State University, chairman of the committee on concrete aggregate specifications of the American Society for Testing Materials and chairman of the committee on specifications of the Mississippi Valley Association of Highway Engineers, on the subject of the proposed standard sizing of sand and gravel. Discussion of this paper will be led by J. C. Buckbee, of the Northern Gravel Co., Chicago, Ill., and a well-known designer and builder of sand and gravel plants.

On Thursday, February 12, will come the annual report on the activities of the association by its business manager,

E. Guy Sutton. This will be followed by the report of the treasurer, George V. Miller, of the Granite Sand & Gravel Co., Indianapolis, Ind., and by a general discussion of the 1920 budget. Then the officers of 1920 will be elected.

The chief subject of discussion in the afternoon will be a big and complicated one—"Transportation"—by A. G. Gutheim, head of the car service section of the United States Railroad Administration. "Federal Aid Roads" will be discussed by Thomas H. Macdonald, chief of the United States Bureau of Public Roads.

On Friday, February 13, will come the reports of the special committees and then a general discussion on the subject of pumping sand and gravel, led by R. Snoddy of the Coon River Sand Co., Des Moines, Iowa; J. M. Chandler of the Price Sand Co., Tulsa, Okla.; S. R.

MacNeal of the Lincoln Sand & Gravel Co., Lincoln, Ill., and Alex W. Bang, of the Keystone Sand & Supply Co., Pittsburgh, Pa.

At noon Friday will be held the annual luncheon of the Association at the Hotel Sherman.

The subject of discussion at the afternoon session will be "Industrial Relations," led by F. D. Coppock, president, Greenville Gravel Co., Greenville, Ohio; V. O. Johnson, Lincoln Sand & Gravel Co., Lincoln, Ill.; T. K. Jensen, Janesville Sand & Gravel Co., Janesville, Wis.; T. A. Rothstein, Beloit Sand & Gravel Co., Beloit, Wis., and Harry Donnelly, Ohio Ballast Co., Cincinnati, Ohio.

Make your hotel reservations now through B. H. Atwood, chairman of the entertainment committee, Interstate Sand & Gravel Co., 133 West Washington street, Chicago.

Tax on Quarry and Gravel Pit Products Proposed

WASHINGTON, D. C.—The substitution of a tax on sales of products of "mines, woodlands and waters" for the present excess profits and certain retail taxes is proposed by Representative Bacharach of New Jersey in a bill he has just introduced in Congress. The tax will cover products of both closed and open (quarries) mines. The rate will be 1 cent on each dollar or fraction thereof of each sale.

Such taxes, in the opinion of Representative Bacharach, would do much to reduce the present high cost of living, which he declares is due in very large measure to the excess profits and other taxes which are "pyramided" by every dealer through whose hands a taxable commodity passes.

It is confidently expected that Congress will repeal the excess profits tax and, as it will be necessary to make up the revenue which that levy brings in, Mr. Bacharach proposes this bill as a tax which will bring in the money and yet not be so distasteful to the public.

[This illustrates a new reason for national associations in the rock products industry. "Eternal vigilance is the price of success" in the rock products game as in every other.—Editor.]

National Slag Association Holds Annual Meeting

APPROXIMATELY 90 per cent of the tonnage of commercialized blast furnace slag was represented at the annual meeting of The National Slag Association held at the office of that organization, Leader Building, Cleveland, Ohio, January 16.

The result of the election of officers for the year 1920 follows: L. A. Beeghley, Standard Slag Co., Youngstown, Ohio, President; C. E. Ireland, Birmingham Slag Co., Birmingham, Ala., Vice-President; H. J. Love, Secretary-Treasurer.

The Executive Committee will consist of the following: President L. A. Beeghley; E. H. Kuttner, Illinois Improvement & Construction Co., Chicago, Ill.; F. A. Sarstedt, Cleveland Macadam Co., Cleveland, Ohio; L. H. Hawblitz, France Slag Co., Toledo, Ohio; H. N. Snyder, Buffalo Slag Co., Buffalo, N. Y.; C. L. McKenzie, Duquesne Slag Products Co., Pittsburgh, Pa.

Organization plans to enlarge the scope of the work of the Association were completed that will enhance the value of the technical and practical side of the material along the lines of diversified uses which have been advocated by the producers.



NEW MACHINERY EQUIPMENT



Screen Driven from Feed End by Reduction Gears

THE ACCOMPANYING view shows the up-to-the-minute type of heavy duty washing screen, as designed by the Worthington Pump and Machinery Corporation, Power and Mining Works, at Cudahy, Wis., for the Oliver Mining Co., Hibbing, Minn. It is characteristic of the type of screen used in the Minnesota iron range district for the washing and screening of ore.

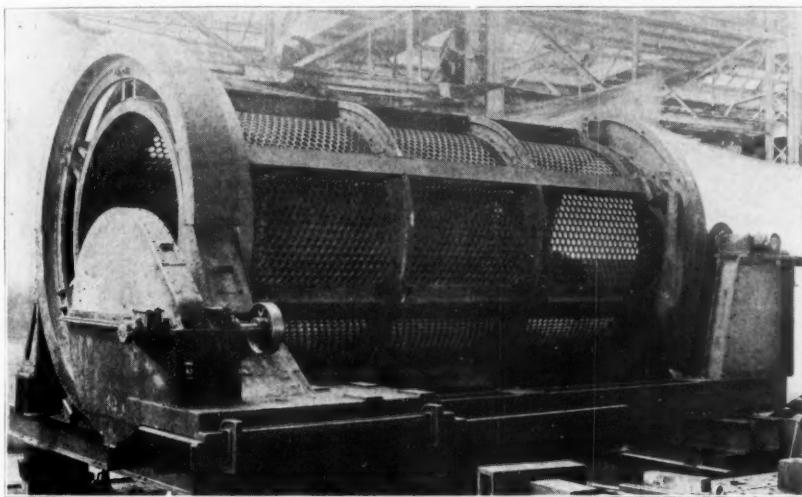
Since this process is very similar to that of washing and wet screening sand

ported areas so that considerable loads may be carried without appreciable strain. The reinforcing being on the outside permits the material to roll with unobstructed path through the screen and so the efficiency of the screening area is increased.

Possibly the most unusual feature of this screen as compared with the ordinary sand and gravel screen is the feed end drive. The screen is driven by a direct connected motor and a set of double reduction gears. The motor is connected by a gear or belt to a small pinion which meshes with and drives a

larger gear. On the same shaft with the large gear there is a smaller gear which comes in contact with teeth on the outside of the screen ring, thus driving the screen. The large gear and pinion are completely encased, as the view shows.

Because of the feed-end drive it is necessary to take up the lateral thrust by roller bearings which are mounted upon the bed plate, and which roll against the discharge end of the screen. The advantage of the feed end drive is that it gives a free and unobstructed passage for the discharge of the rejected material.



New type of wet screen with feed-end drive

and gravel, this screen could very readily be adapted to this industry.

The screen is of unusual interest because of its size, rugged construction and the method used in driving it.

Being designed for handling large quantities of material, it has a large screening area for a screen which has but one size of perforations. The screening surface is 12 ft. long and 72 in. in diameter, and the round perforations are 2 in. in diameter.

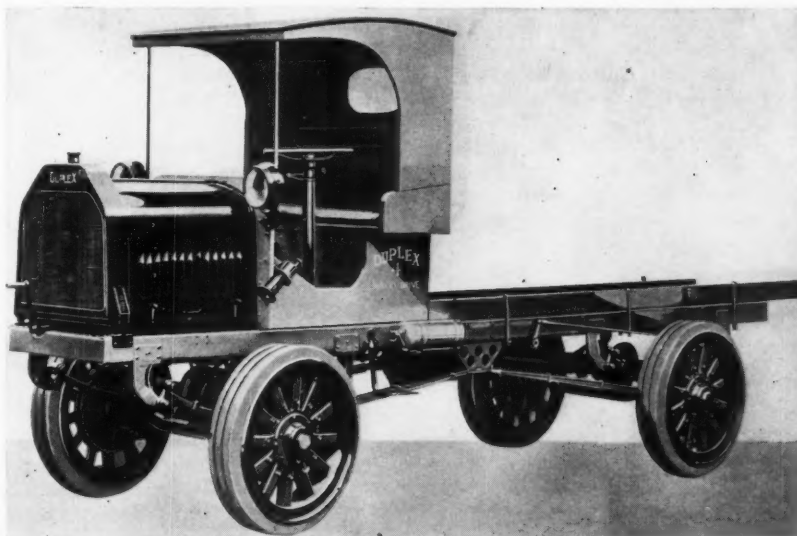
The staunch construction is very apparent from the view. The weight of the screen is supported upon a bed plate which is built up from structural steel sections and extends the entire length of the screen. The roller bearings upon which the screen rides are held in alignment by this bed plate. The screening plates are supported from the outside by six longitudinal braces and by two circular bands which reduce the unsup-

Machinery Men to Meet

THE MATERIAL HANDLING Machinery Manufacturers' Association will hold an open convention at the Waldorf-Astoria Hotel, New York City, February 26 and 27, to which any interested material producer is invited.

New Model Truck

THE VIEW BELOW shows the 1920 model of the Duplex four-wheel drive heavy duty truck. This model has been especially designed for crushed stone and sand and gravel hauling on road work, its manufacturers claim; and will stand hard usage. The same company makes a lighter pneumatic-tired truck for speedier service.



Duplex four-wheel drive 1920 truck

General News from Rock Products Markets

Cleveland Builders Supply Co. Establishes New Delivery System

THE CLEVELAND BUILDERS SUPPLY & BRICK CO., one of the largest of concerns of its kind in the country, which now controls the entire building-supply business of Cleveland, has established a uniform delivery service throughout Greater Cleveland and beyond, that will compare with any service of the kind in the country.

The company beginning this year with the aid of 38 warehouse plants is in the position to deliver to the home builder, or other construction concerns requiring all kinds of building materials throughout Greater Cleveland and suburban districts covering an area of 88 square miles, at the same uniform cost that the materials are delivered in the downtown section.

Using the Public Square as a center, this big building concern describes the free territory as 11 miles east, 11 miles west, and an average of 8 miles south is served with building materials. Over 88 square miles are covered and the same city delivered prices obtains in all parts of this territory.

The company's statement follows:

"The national reputation of Cleveland as a city of homes is a record all Clevelanders are proud of. Home-owning develops the highest type of citizenship, the property owner becomes the taxpayer, a taxpayer has an immediate partnership in the community, state and government.

"Facts have been developed showing that no form of radicalism is found among 'home owners.' Cleveland's May Day demonstration must prove this contention conclusively.

"Materials efficiently produced and economically distributed to all sections of a great and growing municipality at the lowest possible cost is one of the important factors in home building. In this respect Cleveland has the most perfected system of production and distribution of firesafe materials in the world and by its plan of numerous distributing stations affords one price over this widely-spread territory. A uniform low price of firesafe materials for a home builder in the present time of rapidly rising costs stabilizes his overhead charge by making him his own landlord.

"In most of the new sections prices on land have not yet reached their adjusted value, under the depreciated value of the dollar, therefore there is always a chance for a profit to accrue through increased values.

Zone System Abolished

"Of what value this city delivered price is to the growth of our city is best realized when one considers that for years building materials were sold in zone systems, penalizing the developer of outlying lands, and offering a premium to the builder in certain favored localities. Nor could this condition be rectified as long as duplication of effort, long hauls and cross hauls, etc., existed. Today some 38 warehouses and plants advantageously located within this territory assure prompt service anywhere within these boundaries and all at the same price.

"Further, much development of outlying territory, such as sewers, paving, etc., has been delayed for lack of facilities to deliver the necessary materials, but with the present arrangement of warehouses such work can proceed rapidly in all parts of the city.

"With a number of water front plants for receiving cargoes of sand and stone by boat, a supply of aggregate is assured the downtown territory, leaving the outlying districts to be served by rail. Two plaster mills provide facilities for our 'Klingstone Stucco,' 'Mason's Myx,' 'Cement Topping' and other plastering materials, while five brick plants and seven tile plants insure prompt service on these commodities at the lowest prices."

Motion Picture of Indiana Cut Stone Industry

THE INDIANA LIMESTONE QUARRYMEN'S ASSOCIATION, Bedford, Ind., has had a three-reel motion picture film made by the Rothacker Film Manufacturing Co. of Chicago, showing the wonderful machine methods employed in quarrying Indiana limestone and the extensive factory system used in preparing the material for market.

After picturing the removal of the earth covering the deposits of stone by hydraulic process or by steam shovel, the films portray steam and electric channellers traveling back and forth cutting vertical channels two inches wide and from 10 to 44 feet deep into the masses of stone. Breaking the stone loose by means of wedges is next shown, then how the blocks—some of them weighing 250 tons each—are lifted from the quarry. The processes of sawing, planing, turning, cutting and carving are represented in rotation. The film is to be displayed before architectural organizations, college students, building conventions, etc.

Big Concrete Job in Texas

CORPUS CHRISTI, TEXAS—As a means of protecting the lower part of Corpus Christi from a repetition of the overflow from the bay as during the great storm of a few months ago, a seawall is to be constructed along the water front for a distance of three miles and at a cost of approximately three million dollars.

The plans call for a 12-ft. wall of mass concrete, built on the type of the Galveston seawall. This concrete will rest on piling which will be protected by sheet piling in front, driven down to the impervious clay to prevent any seepage under the base of the wall. The top of the wall proper will be two feet above the highest water on record in Corpus Christi.

The first section to be build will be only about one-fifth of the entire wall, and will be that section which will afford protection to the main business district.

Prices of Quarry Labor Paid by a Big Eastern Operator

Classification.	Rate per hour.
Day watchman	none
Night watchman	30c to 40c
Millwright	none
Mill oilers	30c to 45c
Crusher feeders	30c to 45c
Blacksmith	45c to 55c
Blacksmith helper	40c to 50c
Crane engineer	none
Dinkey engineer	35c to 45c
Dinkey brakeman	35c to 45c
Steam shovel runner	60c to 80c
Steam shovel craneman	50c to 75c
Steam shovel fireman	40c to 50c
Locomotive crane engineer	40c to 45c
Locomotive crane fireman	40c
Common laborer	30c to 50c
Crusher men	30c to 50c
Locomotive engineers	50c
Steam shovel engineer	(See runner)
Quarry and track men	30c to 50c
Mechanics	40c to 60c
Firemen—shovel	(See shovel)
Well drillers	40c to 50c
Tripod drillers	40c to 50c
Carpenters	40c to 50c
Powder and dynamite handlers	40c to 50c
Track walkers	
Stationary engineer	40c to 50c
Stationary firemen	35c to 45c
Quarry foremen	
Teamsters	45c to 60c
Water line men	
Crusher clerk	40c to 50c

General News from Rock Products Markets

Contracts Let for Construction of New South Dakota Cement Plant

THE BLACK HILLS ROCK PRODUCTS CO., Rapid City, South Dakota, represented by John J. Farrar, president; Ralph Crites, superintendent, together with J. C. Buckbee, of the J. C. Buckbee Co., Chicago, consulting engineer, has made contracts with the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., for cement making machinery to equip a 1500 bbl. mill.

The new plant will be built three miles from Rapid City on the Chicago & Northwestern Ry. The wet process will be employed.

The property owned by the Black Hills Rock Products Co. contains immense deposits of limestone, shale, and gypsum, all the essentials necessary to make portland cement, within a radius of 1000 or 1500 ft. This property was purchased by Mr. Farrar and V. T. Jepsen some fifteen years ago with the end in view of erecting a portland cement plant. After many struggles and discouragements they established a flourishing lime business in 1912. They are now about to realize the rest of their ambitions in the utilization of these materials for the manufacture of portland cement.

Large Extensions Being Made by Petoskey Portland Cement Co.

THE PETOSKEY PORTLAND CEMENT CO. early last year started upon an extensive campaign of improvements that are now well under way and will be completed during the coming season. The company's property fronts for over two miles on Little Travers Bay of Lake Michigan and a dock some 400 ft. long, constructed throughout of con-

crete, affording 23 ft. of water, will permit the company early this season to accommodate the largest of lake boats for shipping crushed stone and cement and receiving coal and supplies. This dock is built of pre-cast concrete blocks 16 ft. by 15 ft. by 4 ft. in size and weighing 40,000 lbs. each. To handle the same, the company purchased from the Brownhoist Machinery Co., of Cleveland last spring one of the largest locomotive cranes built to date. This crane also carries a 3-yard clamshell bucket for unloading cars, stock, piling, etc.

A new crushing plant, constructed entirely of steel and concrete, was built last fall and will start operation this spring. The initial crusher is a Number 12 Gates, and is followed by four Number 5 Austin crushers. All are served by two No. 12 elevators and four 60-in. by 24-ft. screens. The plant is driven by a 400 h. p. motor and will add 2,500 tons daily to the company's crushed stone capacity, giving them a total output with the present plant of some 4,000 tons daily.

Contracts have been placed for the new cement plant equipment. The plant will have a capacity of 2,500 barrels daily and will be the last word in all that is modern and efficient in the wet process manufacturing of cement. Allis-Chalmers compeb mills are to be used for grinding both raw material and clinker. The kilns will be 10-ft. in diameter by 150-ft. long, and the waste gases from same will be utilized in Edgemoor boilers to generate steam for two 1,250 k. w. turbo alternators, providing 3 phase, 60 cycle, 2,300-volt current for operating the entire work. The buildings throughout will be of steel and concrete and the stockhouse will be of 100,000 bbls. capacity.

Large repair shops, laboratory and office facilities are being provided so the company will be prepared in every way

for the most efficient operation. The cement plant is expected to go into operation by next September. In addition to boat shipments via the Great Lakes, the company is served by both the Pere Marquette and Grand Rapids & Indiana railways.

All the above improvements are being carried out under the direction of the J. C. Buckbee Company, Engineers, of Chicago, Ill. J. B. John, for many years with the Lehigh Portland Cement Co. and of late years so successful in handling the Newaygo Portland Cement Co. property, has recently become heavily interested in the Petoskey Portland Cement Co., and has been made vice-president and general manager. Mr. John will continue as vice-president and general manager of the Newaygo company.

Slag Producers Issue Bulletin

THE NATIONAL SLAG ASSOCIATION has issued No. 1, Vol. 1, of its new national bulletin designed to aid in the promotion of crushed blast-furnace slag. The editor, H. J. Love, secretary-treasurer of the association, makes his announcement as follows:

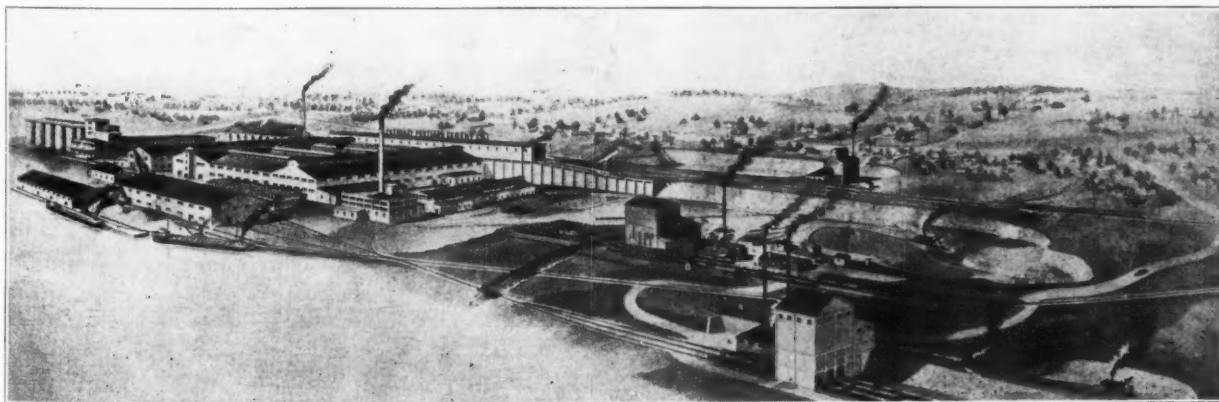
"A harp without strings.

"A big order, an empty fountain pen.

"A message to be delivered and speechless.

"An organization such as the National Slag Association finds itself in pretty much the same classification as the above if there is no medium of getting its information to the attention of those interested in the production and use of the material.

"In this, our maiden effort at presenting a part of our story, we are naturally confined to a short resume of the industry. Future issues of the organ will be published occasionally."



Layout of the Petoskey Portland Cement Co. which is under construction

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.00	1.75	1.50	2.00	2.00	1.25
Burlington, Vt.			1.65	1.35		
Chaumont, N. Y.			Flux, 1.50@2.10			
Coldwater, N. Y.			2.50	2.00		
Limekiln, Md.	1.25	2.10	2.00	1.75	1.40	1.25
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Pittsburgh, Pa.	1.25	1.40	1.50	1.50	1.50	1.50
Redington, Pa.	1.00	1.10	1.10	1.10	1.10	1.10
CENTRAL:						
Alden, Ia.	.70	.70	1.35	1.35	1.35	1.35
Alton, Ill.	2.00		1.50	1.50		
Bettendorf, Ia.			1.50 per cu. yd., all sizes			
Brillion and Sherwood, Wis.	.90@1.00		1.00	1.00		1.00
Buffalo, Ia.	.90	1.45	1.35	1.25	1.25	
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*		
Dundas, Ont.	.65	1.20	1.20	1.20	1.00	1.00
Eden and Knowles, Wis.	1.00@1.10	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20	
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Greencastle, Ind.	1.50	1.25	1.10	1.00	1.00	1.00
Hull, Canada	2.50	2.30	2.50	2.10	2.00	1.75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	
Krause, or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Laumon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Moline, Ill.			1.50—2300 lbs. all sizes			
Montrose, Ia.	1.25	1.15@1.25	1.15@1.25	1.10@1.25	1.10@1.15	
Oshkosh, Wis.			1.40 per ton, all sizes			
Ottawa, Ont.	2.50	2.75	1.25	2.25	2.00	
River Rouge, Mich.		1.25	1.25	1.25	1.25	1.25
Sheboygan, Wis.			1.00 to 1.25 all sizes			
St. Louis, Mo.	.60	1.60	1.40	1.40	1.40	
Stolle, Ill.	2.00	1.40	1.40	1.40	1.40	
Stone City, Ia.	.80		1.60	1.50	1.40	
Toledo, Ohio, f. o. b. cars	1.60	1.90	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.10	2.10	2.10	1.90	1.90
SOUTHERN:						
Brooksville, Fla.	1.00		2.80			
Cartersville, Ga.		2.20	2.10	2.00		1.90
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	1.00
Fort Springs, W. Va.	.90	1.00	1.60	1.75	1.35	
Hopkinsville, Ky.	1.25	1.10	1.10	1.10	1.10	1.10
Mascot, Tenn.		1.00@1.25		1.50	1.50	
Memphis Jct., Ky.			1.10@1.35, all sizes			
Winnfield, La.	.80	2.50		2.00	2.00	
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.70	1.70
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Kansas City, Mo.	.60	2.00				

Crushed Trap Rock

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.		.90	2.75	2.50	2.00	1.75
Bound Brook, N. J.	1.00@1.25	2.00@2.25	1.80@1.90	1.60@1.80	1.50@1.70	
Branford, Conn.	.80	1.50	1.50	1.20	1.10	
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Castro Pt., Richmond, Cal.	.50*		1.50*	1.50*	1.40*	
Dresser Junction, Wis.	.50	1.75	1.75	1.55	1.50	1.50
Duluth, Minn.	.75	1.75	1.50	1.15	1.15	
E. Summit, N. J.	2.00@2.25	2.25@2.50	2.00@2.25	1.75@2.00	1.75@2.00	
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35
Millington, N. J.	1.80	1.80	1.80	1.60	1.00	
New Britain, Conn.	.80	1.30	1.25	1.20	1.00	
Westfield, Mass.	.60	1.20	1.10	1.00	.90	.80

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20
Middlebrook, Mo.—Granite	3.50		1.75	1.75		1.00
Portland, Maine—Granite	1.50			1.35		
Roseburg, Ore.		1.50	1.25	1.05	1.00	
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20
Granite	1.25		1.50	1.50	1.50	

*Cubic yard. †Agril. lime. ‡R. R. ballast. §Flux. †Rip-rap. a 3-inch and less.

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN:	
Coldwater, N. Y.—Analysis, 56.77% CaCo ₃ , 41.74% MgCo ₃ —80% thru 100 mesh; bulk.....	5.00
Ppr.	4.50
Chaumont, N. Y.—Analysis: CaCo ₃ , 92 to 98%; MgCo ₃ , 1.51%—(Thru 100 mesh); ppr., 4.00; bulk.....	2.50
Paper bags	4.00
Grove City, Pa.—Analysis: CaCo ₃ , 94.75%; MgCo ₃ , 1.20%—(70% thru 100 mesh); 50 lb. ppr., 4.60; bulk.....	3.25
Grove, Md.—90% thru 4 mesh; bulk.....	3.00
Hillsville, Pa.—Analysis, CaCo ₃ , 96% (90% thru 100 mesh); bulk.....	2.75
Sacks	4.50
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Lime Kiln, Md.—50% thru 50 mesh; bulk	4.00
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk.....	2.75
West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa.—Analysis, CaCo ₃ , 88-90%; MgCo ₃ , 3-4%—(50% thru 50 mesh); bulk	3.00
Bags	4.50
CENTRAL:	
Alton, Ill.—Analysis: CaCo ₃ , 96%; MgCo ₃ , 0.75%—50% thru 4 mesh.....	2.50
Bedford, Ind.—(90% thru 10 mesh) Analysis, CaCo ₃ , 98.5%; MgCo ₃ , 0.5%	1.75
Belleville, Ont.—Analysis, CaCo ₃ , 90.9%; MgCo ₃ , 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, CaCo ₃ , 53.63%; MgCo ₃ , 37.51%—90% thru 50 mesh	1.00
Columbia, Ill., near East St. Louis (¾" down)	1.25@1.80
Ellettsville, Ind.—Analysis, Carbonate, 98%	2.00
Elmhurst, Ill.—(Analysis, CaCo ₃ , 35.73%; MgCo ₃ , 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, CaCo ₃ , 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100.....	2.75@3.00
Kansas City—(50% thru 50 mesh)	2.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, CaCo ₃ , 44%, MgCo ₃	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis, CaCo ₃ , 86%; MgCo ₃ , 8%	2.50
Marblehead, O.—(Analysis: CaCo ₃ , 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk	2.75
McCook, Ill.—Analysis, CaCo ₃ , 54.10%; MgCo ₃ , 45.04% — 100% thru ¾" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 10090@1.00
Milltown, Ind.—Analysis, CaCo ₃ , 94%; MgCo ₃ , 3%—(100% thru 4 mesh).....	1.50
Montrose, Ia.—(90% thru 100 mesh)	1.25
Muskegon, Mich.—(90% thru 50 mesh) Analysis, CaCo ₃ , 53.35%; MgCo ₃ , 43.27%	2.50
Piqua, O.—Analysis: CaCo ₃ , 82.8%; MgCo ₃ , 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh; bulk.....	2.75@4.50
Rockford, Ill.—Analysis, CaCo ₃ , 53.75%; MgCo ₃ , 44.35%	1.25
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¾" mesh) Analysis, CaCo ₃ , 89.61 to 89.91%; MgCo ₃ , 3.82%	2.00
St. Paul, Ind.—Analysis, CaCo ₃ , 85%; MgCo ₃ , 12%	1.50
Stone City, Ia.—Analysis, CaCo ₃ , 98% (50% thru 100 mesh).....	.80

(Continued on next page.)

Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

Toledo, O.—Analysis, CaCo ₃ , 52.72%; MgCo ₃ , 43%—(20% thru 100 mesh; 30% thru 50; 80% thru 100; 100% thru 5/32 screen).....	1.80
Whitehill, Ill.—Analysis, CaCo ₃ , 96.12%; MgCo ₃ , 2.50%—90% thru 50 mesh, bulk.....	2.00
90% thru 100 mesh.....	5.00
SOUTHERN:	
Brooksville, Fla.—50% thru 50 mesh.....	2.80
Cartersville, Ga.—Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in.....	2.50
Dittlinger, Tex.—Analysis, CaCo ₃ , 99.09%; MgCo ₃ , .04%.....	2.00
90% thru 100 mesh.....	2.00
90% thru 4 mesh.....	1.00
Grovania, Ga.—Analysis, CaCo ₃ , 95%; MgCo ₃ , none—50% thru 100 mesh.....	2.50
Hopkinsville, Ky.—Analysis, 94.6 to 94.1% CaCo ₃ —Bulk.....	2.00
Knoxville, Tenn. (pulverized limestone) (20% thru 100 mesh).....	2.50
Memphis Jct., Ky.—(Analysis, CaCo ₃ , 95.3%; MgCo ₃ , 1.12%; average price, 1/8 in. down.....	2.00
Mascot, Tenn.—Analysis, CaCo ₃ , 52%; MgCo ₃ , 38%.....	2.50
(80% thru 100 mesh).....	2.00
(All thru 10 mesh).....	3.50
(80% thru 200 mesh).....	2.00
Paper bags, \$1.50 extra per ton; burlap, 2.00 extra per ton.....	2.50
Maxwell, Va.—Analysis, CaCo ₃ , 76.6%; MgCo ₃ , 22.8%—100% thru 20 mesh; bulk.....	4.75
100 lb. ppr sacks.....	5.75
Ocala, Fla.—Analysis, CaCo ₃ , 98%—(75% thru 200 mesh).....	4.50
Tyrone, Ky.—Analysis, CaCo ₃ , 93%; MgCo ₃ , 6%—90% thru 4 mesh.....	2.25
Winnfield, La.—(50% thru 50 mesh).....	3.00
WESTERN:	
Cement, Calif.—50% thru 50 mesh.....	4.00
Colton, Calif.—Analysis: CaCo ₃ , 95%; MgCo ₃ , 1 1/4%; bulk, 2.50; bags.....	3.50
Sacks, 15c extra, returnable.....	
Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk.....	1.35

Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:	
Berkeley Springs, W. Va.....	2.10
Special hand selected rock.....	2.50
Bridgeton, N. J.....	2.00
Cedarville and South Vineland, N. J.—Glass, damp.....	2.00
Glass, dry.....	2.50
Gray Summit, Mo.....	2.00@2.50
Guion, Ark.—Carlots.....	2.00
Klondike and Pacific, Mo.: Contracts.....	2.00
Carlots.....	3.00
Mapleton, Pa.....	2.50
Glass, damp.....	2.00
Massillon, Ohio.....	3.00
Michigan City, Ind.—.....	.30@.40
Millington, Ill.—Contracts.....	2.00
Mineral Ridge, O.....	2.75
Montoursville, Pa.—Green, washed.....	1.50
Oregon, Ill.—Large contracts.....	1.75
Open market.....	2.50
Ottawa, Ill.....	1.75
Robinson, Md., washed, screened, not dried.....	2.00
St. Marys, Pa.—Green.....	2.50
Sands, Elk Co., Pa.—Selected, green.....	2.50
Thayer, W. Va.—Washed.....	2.50
Unwashed.....	2.00
FOUNDRY SAND:	
Albany, N. Y.—Core.....	1.50@2.50
Furnace lining.....	2.25@2.75
Molding coarse, fine.....	2.50
Brass molding.....	2.50
Sand blast.....	2.75@4.00
Allentown, Pa.—Core.....	1.50@1.75
Molding coarse.....	1.50
Arenzville, Ill.—Molding fine.....	1.50
Beach City, Ohio—Core.....	2.00
Green silica sand (not dried).....	2.00
Washed silica sand (not dried).....	2.25
Bowmantown, Pa.—Core.....	1.25
Furnace lining.....	2.50
Molding, fine and coarse.....	1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.....	1.00	1.00	1.00	1.00	.80	.80
Attica, N. Y.....	.65	.65	.75	.75	.75	.75
Concord Jct., Mass.....	1.00	1.00	1.25	1.25	1.25	1.25
Farmingdale, N. J.....	.75	.75	1.25	1.15	1.15	1.50
Hartford, Conn.....	.90	1.25	1.15	1.00	1.00	1.15
Morristown, N. J.....	.60	.60	1.20	1.00	1.00	1.25
Portland, Me.....	.50	1.50	1.35	1.25	1.25	1.20
Washington, D. C. (F. O. B. wharves on cars).....	.75	.75	2.00	1.40	1.20	1.20
Yardville, N. J.....	.50@.75, all sizes					
CENTRAL:						
Alton, Ill.....	.60@.75	.60@.75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.....		.60	1.25@1.50	1.00	1.00@1.25	1.00
Attica, Covington, Silverwood, Ind., Palestine, Ill.....	.75	.75	.75	.75	.75	.75
Barton, Wis.....	.85	.80	1.00	.80	.80	.80
Beloit, Wis.....			.50 sand, .70 gravel			
Chicago.....	1.25@1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Columbus, O.....	1.00	1.00	1.00	1.00	1.00	1.00
Covington, Ind.....	.75	.75	.85	.75	.75	.75
Des Moines, Ia.....	1.00	.75	1.65	1.65	1.50	1.50
Earlestead (near Flint), Mich.....	.60	.60				.70
Eau Claire, Wis.....					1.10	
Elgin, Ill.....	.80	1.00	.80	.80	.80	.80
Ft. Jefferson, Mechanics'g, O.....	.50@.60	.50@.60	.50@.60	.60@.70	.60@.70	.60@.70
Grand Rapids, Mich.....	.50	.60	1.00	.90	.80	.80
Hersey, Mich.....	.50	.60	1.10	1.10	1.10	
Indianapolis, Ind.....	.60	.60	1.50	.75	.75	.75
Janesville, Wis.....	.65	.65	.75	.75	.75	.75
Milwaukee, Wis.....	.70	.70	.80	.80	.80	.80
Saginaw, Mich.....	1.00	1.10	2.10	1.95	1.95	1.85
St. Louis, Mo., F. O. B. cars.....	2.20@2.25					
Summit Grove, Ind.....	.75	.75	2.50	2.30	2.30	2.25
Terre Haute, Ind.....	.75	.75	.75	.75	.75	.75
Toledo, Ohio.....			.60, all sizes			
Yorkville, Moronta, Oregon and Ottawa, Ill.....	.75	.75	.75	.75	.75	.75
SOUTHERN:						
Alexandria, La.....		.80				1.50@1.75
Arkansas City, Ark.....		.75				
Knoxville, Tenn.....	.85	.85	.85	1.50	1.50	1.25
Lake Weir, Fla.....		.60				
Macon, Ga.....	.75@1.00					
Pelzer, S. C.....	.70	.70				
Pine Bluff, Ark.....	1.25	.92				
Roseland, La., and Condon, Miss.....		.50			1.25	
Thomas, La.....	.60					1.75
Tulsa, Okla.....	.70	.70				
Valde Rouge, La.....	.80	.80			1.25@1.50	
Waco, Texas.....	.70	.70			1.10	1.10
WESTERN:						
Kansas City, Mo.....			(Kaw river sand .75 per ton, carlots)			
Pueblo Col.....	.95*	.75*	1.50*			2.00*
Saratoga, San Jose, Calif.....	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75
Seattle, Wash.....	1.25*	1.25*	2.00*	1.25*	1.25*	1.25*
Vancouver, Wash.....	1.30*	1.45*	1.30*	1.30*	1.10*	1.10*
Yorkville, Ore.....	.60	.60@.75	.70	.60@.75	.60	.50@.60
Bank Run Sand and Gravel						
City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.....	.75	.75				
Burnside, Conn.....	.80*					
Fishers, N. Y.....			.70@.75 per ton, all sizes			
Yardville, N. J.....	.50@.75					
York, Pa.....	1.00@1.10		(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., Palestine, Ill.....	.60	.60	.60	.60	.60	.60
Earlestead (near Flint, Mich.).....			.60 per yd.			
Eau Claire, Wis.....					.75	
Escanaba, Mich.....			1.00 cu. yd., all sizes			
Grand Rapids, Mich.....	.40	.40	.75	.60	.60	.60
Hersey, Mich.....	.40	.50	.60	.60	.60	.50@.60
Janesville, Wis.....					.55	
Oxford, Mich.....			Including cobbles, \$1.00 per yd.			
Saginaw, Mich. (Incl'dg. frt.).....	1.40	1.40	1.40	1.40	1.40	1.40
Summit Grove, Ind.....	.50	.50	.50	.50	.50	.50
Wabash Valley District, Ind.....			.60 for all sizes			
Yorkville, Moronta, Oregon and Ottawa, Ill.....	.60					
SOUTHERN:						
Albany, Ga.....	.70@1.00					
Alexandria, La.....		.95	As it comes, .75	1.00		
Dudley, Ky. (Crushed Sand).....						
Gravel Siding, Miss.....		.90	Mine run 45c per ton	1.50	1.50	1.30
Knoxville, Tenn.....	.90					.50
Lindsay, Tex.....	1.00					
Pine Bluff, Ark.....			Road gravel .45			.40@.70
Thomas, La.....						.60@.75
Valde Rouge, La.....						
WESTERN:						
Pueblo, Col.....			River Run, .75* unscreened			
Saratoga, San Jose, Calif.....	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75	.60@.75
Yorkville, Ore.....	.40	.40			.40	

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag Wholesale at Plant per Ton

City or shipping point	Screenings,					
	Roofing	¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less and larger
EASTERN:						
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85
Buffalo, N. Y.	2.00	1.00	1.00	1.00	1.00	1.00
Cleveland, Ohio		.85	1.00	1.05	1.05	.95
E. Canaan, Conn.	4.00	1.00	1.50	1.25	1.10	1.10
Erie, Pa.	2.00	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.		1.25	1.25	1.25	1.25	1.25
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	.95
Hokendaugua and Tipton, Pa.	2.50	.85	1.50	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85
Philadelphia Dist.	2.50	1.00	1.50	1.00	1.00	1.00
Pittsburgh, Pa., Dist.	2.05	1.15	1.50	1.15	1.15	1.15
Sharpsville, Pa.	2.00	1.20	1.60	1.20	1.20	1.20
CENTRAL:						
Chicago, Ill.			All sizes, \$1.50, F. O. B. Chicago			
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit			
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25
Toledo, O.			All sizes, 2.00, F. O. B. Toledo			
Youngstown, Dover, Hubbard and Leontonia, O.	2.00	1.20	1.60	1.20	1.20	1.20

Agricultural Lime and Hydrate at Plant per Ton

	—Agricultural Lime—		Per Cent	Per Cent	Agricultural
	Bulk	Bags	CaO	MgO	Hydrate
EASTERN:					
Adams, Mass.		7.50@8.00	65		
Apollo, Pa.	3.25		95.14	1.44	
Bellefonte, Pa.	7.00		98.5	.72	
Berkeley, R. I.		14.00	45	15	
Bridgeport, Pa.	7.50@9.00		55	44	9.00@11.00
Cavendish, Vt.			2.50 bbl. in car lots		
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	5.50@6.00	7.50	78.67	1.33	
Farnams, Mass.	5.50			0-2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove City, Pa.	3.25	4.50	94.75	1.20	10.25
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollidaysburg, Pa.	5.50@8.00		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Bluff, Pa.	5.00@6.25		78.67	1.33	
Lime Kiln, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.00@6.25		80.56 to 62.56	3.87 to 1.75	
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang, Pa.	5.00		60	12	
Rosedale, N. Y.	8.00		96	5	(Bulk, 6.00)
Sandville, O.					9.00
Steuben, Pa., Dover Plains, N. Y., York, Pa.		7.00@9.50	70		10.75 to 12.00
Union Bridge, Md.	8.50		73	1	10.75
Williamsport, Pa.	5.00	10.00	65 to 80	2 to 4	10.00
Williams Station, Pa.			39.5	39.1	9.75@10.50
York, Pa.	8.00		90 to 95	2 to 7	10.75
CENTRAL:					
Alton, Ill.	10.90		94.0		
Delaware, O.			61.09	9	9.75
Forest, O.	7.50				
Knowles, Wis.		10.00	55	45	9.50
Manistique, Mich.	10.00@11.00		95	2	12.00@13.00
Marblehead, Ohio			54	16.0	9.75
Mitchell, Ind.	9.00				11.00
Springfield, Ohio			33.62	17.73	10.50
Woodville, Ohio		9.25	47-48	31-32	10.50
SOUTHERN:					
Blowers, Fla.	5.00	7.25	98.0		
Burns, Tenn.	9.00		96	0.54	12.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	8.00		97.82	0.12	
Karo, Va.	8.00		97.0	1.26	
Lineton, Va.	8.50		97	1.74	
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	5.00		84	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	7.50		96.48		
WESTERN:					
Bellins, Wash.					12.00
Colton, Calif.	4.50		97	2	15.00
Lime, Ore.	15.00		91.48	0.58	
Oscas Island, Wash.		5.50			16.50
San Francisco, Calif.					15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands per Ton

(Continued from preceding page)

Bridgeton, N. J.—Core	2.00	Franklin, Pa.—Traction	2.25
Cleveland, O.—Molding coarse	2.50	Brass molding	2.75
Brass molding	2.50	Molding fine, steel molding	2.00
Molding fine	2.75	Molding, coarse	2.00@2.50
Columbus, O.—Core	2.00	Sand blast	3.50
Brass molding	2.50	Core	2.00
Molding fine, steel molding	2.50	Greenville, Ill.—Molding coarse red	1.60@1.80
Conneaut, O.		Guion, Ark.—Molding fine	2.00@2.25
Molding fine	2.75@3.00	Roofing	3.00
Molding coarse	2.50@2.75	Stone sawing	2.50
Eau Claire, Wis.—Core	2.25	Hancock, Md.—Core and brass mldg.	1.65
Brass molding and sand blast	2.25	Hellam, Pa.—Core	2.00
Fleetwood, Pa.—Furnace lining	2.25	Joplin, Mo.—Stone sawing, flint	1.25
		Kansas City, Mo.—Missouri River core	.85
		Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50

Leesburg, Pa.—Core, furnace lining, molding fine and coarse	2.00
Mapleton, Pa.—Molding, fine and core, damp	2.00@2.50
Molding, fine, dry	3.00
Massillon, O.—Molding fine	2.50
Molding coarse	2.50
Traction	2.50
Furnace lining	3.00
Core	2.50
Michigan City, Ind.—Core, bank	.50@.60
Traction	.50
Millington, Ill.—Roofing, stone sawing	2.00
Core and furnace lining	1.75
Core	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened (damp)	2.10
Montoursville, Pa.—Core	1.25@1.50
Traction	1.15@1.35
Brass molding	1.25
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core	2.25@2.50
Furnace lining	2.75@3.00
Sand blast	2.00
Molding fine	2.00
Ottawa, Ill.—Sand blast	3.00
Core, furnace	2.00
Roofing sand	2.00
Stone sawing	1.75
Providence, R. I.—Molding fine	1.90
Molding coarse	2.00
Brass molding	2.25
Sand blast	3.00@4.00
Sugar Grove, Ohio—Core (dried and screened)	2.00
Traction	2.00
Thayers, Pa.—Core and traction	1.75@2.00
Furnace lining, molding	1.25
Utica, Pa.—Core	2.00
Molding coarse, traction	2.50
Brass molding	2.75
Sand blast	3.50
Warwick, O.—Core	2.25
Furnace lining	2.25
Molding fine	2.25
Molding, coarse	2.25
Traction and brass molding	2.25
Wedron, Ill.—Core, (crude silica)	.75@1.00
Molding fine, coarse	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding fine and brass	2.00@2.50
Molding coarse	1.75@2.25

Gypsum, per Ton, at Plant

Castalia, O.—Crushed, to cement mills	3.50
Ground, to cement mills	3.50
Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00 per ton	
Fort Dodge, Ia., bulk	3.50
Garhutt, N. Y.—Land plaster, bags	7.00
Grand Rapids, Mich.—Crushed gypsum	7.00
Ground gypsum rock	9.00
Gypsumville, Man., Can.	3.50
Oakfield, N. Y.	7.00
Sandusky, O.	6.00
Jute sacks, \$3.00 extra; paper, \$1.00 extra.	

Ground Rock Phosphate at Plant, per Ton

Centerville, Tenn.—B. P. L., 70%; ton	9.50@10.00
2000 lbs. (90% thru 100 mesh)	9.50@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 60%	7.00
B. P. L., 60% to 70%	7.00@9.00
Gordonsburg, Tenn.—B. P. L., 72%; ton, 2240 lbs. Ground 90% thru 100 mesh	8.50
Lump rock	6.00@7.50
Mt. Pleasant, Tenn.—(B. P. L. 68%)	
13%	7.80
14%	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	9.50
Nichols, Fla.—Pebble, B. P. L., 68%	10.00
Wales, Tenn. (95% thru 100 mesh) (guaranteed 14% phosphorus equivalent)	8.25
Walls, Tenn.—B. P. L., 70.2%—To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District (Add 2.50 for sacks)	10.00@12.00
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	15.00



Passed By The Screen



Incorporations

Mount Robson Quarries, Ltd., Vancouver, has been incorporated with a capital of \$500,000.

The Feldspar Products Co., Ltd., Toronto, has been incorporated with a capital of \$1,000,000.

The St. Mary's Cement Co., Ltd., Ontario, has been incorporated with a capital of \$3,000,000 to manufacture cement and by-products.

Dolomite Products Co., Ltd., Toronto, has been incorporated with a capital of \$100,000 by B. R. Gordon, J. A. W. Archer and Alexander Watson.

The Marion Stone Co., Marion, Ohio, has been incorporated under the laws of Ohio, with a capital of \$100,000. The incorporators are: C. E. Merkel, M. J. Morral, J. D. Guthery, John Bauldaur, T. E. Guthery.

The Coast Rock and Gravel Co., San Francisco, Calif., has been incorporated under the laws of the state of Calif., with a capital of \$250,000. The incorporators are E. O. Sacramento, F. N. Woods and A. R. Wilson.

The Hydro-Stone Products Co., Milwaukee, Wis., has been incorporated for the purpose of dealing in hydro-stone and products. The capital is \$75,000 and the incorporators are C. S. Stewart, P. O. Powell and E. G. Orbert.

The Pacific Sand Co., Portage, Wis., has been incorporated to deal in molding, foundry, glass and building sands, commercial sands and gravels. The capital is \$20,000. The incorporators are E. R. Calkins, J. H. Koepp and A. M. Koepp.

The E. C. Glysson Co., Inc., of Barre, Vt., has filed articles of association with the Secretary of State at Montpelier, Vt., for the purpose of quarrying and dealing in granite. The capital is \$50,000 and the incorporators are E. C. Glysson, John Gibbs and Emma C. Glysson, all of Barre, Vt.

The Mexican Oil Corporation, Portland, Maine, has been incorporated for the purpose of handling and dealing in all kinds of minerals, bitumen hydro-carbons, and all their by-products. The capital is \$15,000,000. The officers are E. V. Mann, president; M. D. Mills, treasurer and C. D. Booth, clerk.

Crookston Quarries, Ltd., Crookston, Ont., has been incorporated with a capital of \$300,000 to carry on the business as quarry masters and to deal in polished and crushed stone, etc. Provisional directors are H. H. Davis, E. H. Brower, J. R. Rumball, H. V. Hearst, L. A. Landrian, all of Toronto.

Highland Park Sand & Gravel Co., Richmond, Va., has been incorporated under the laws of the state of Virginia to excavate and deal in rock, sand, gravel, clay and similar products. The capital is \$25,000. The incorporators are: I. R. Lambert, president; J. H. Oliver, secretary, both of Richmond, Va.

The Federal Crushed Stone Co., Minneapolis, Minn., has been incorporated for the purpose of quarrying, finishing and marketing stone, marble, limestone, and other products, and to manufacture the same into various products. The capital is \$300,000 and the incorporators are L. S. De Mars, L. Z. Wright and M. M. Lloyd.

The Blair Quarry Co. has opened books for subscription to \$30,000 capital stock at the office of Benet Shand and McGowan, 912 Palmetto Building, Columbia, South Carolina. This company proposes to deal in real estate, produce crushed stone and market the same. The incorporators are W. H. Lyles and Christie Benet.

The Federal Portland Cement Co., Augusta, Me., has been incorporated under the laws of the state of Maine for the purpose of manufacturing and dealing in cement, lime, brick, and other building materials. The capital is \$4,200,000. The incorporators are: President and treasurer, M. A. Free; clerk, Fred H. Lancaster.

The Southern Gravel Co., Birmingham, Ala., has been incorporated under the laws of the State of Alabama to own and operate a gravel plant. The firm's property includes 40 acres of land and the plant which is being built will have a capacity of 30 cars per day. The officers of the company are: Knox Burger, president and treasurer; L. L. Lange, vice-president, and E. C. Ames, secretary.

The Super-Cement (America) Co., Ltd., with head offices in Toronto, has taken out a federal charter, with a capital of \$500,000.

The Jumbo Asphalt Co., Hugo, Okla., has been incorporated with a capital of \$200,000. The incorporators are Z. J. Harrison, Luther Carter and C. E. Bailey.

The Kentucky Silica Sand Co., Cincinnati, Ohio, has been incorporated under the laws of the state of Ohio with a capital of \$25,000. The incorporators are H. S. Katz and Samuel Etern.

The New Haven Asbestos Products Co., New Haven, Conn., has been incorporated under the laws of the state of Connecticut with a capital of \$10,000. The incorporators are L. H. Merliss, Aocco Ierardi and J. V. Porto.

The Hercules Moulding Sand Co., Inc., Lawrence, Mass., has been incorporated under the laws of the state of Massachusetts, with a capital of \$100,000. The incorporators are J. M. Forbes, president; C. H. Rogers, treasurer, and E. A. Rowe.

The D. V. Johnson Stone Co., Nashville, Tenn., has been incorporated with \$50,000 capital stock. The company will engage in mining and quarrying marble, granite and ornamental stones. The incorporators are D. V. Johnson, D. M. Johnson and Eugene Roberts.

The Greene-Grignon Granite Co., Duluth, Minn., has been incorporated for the purpose of operating quarries, the manufacturing of granite, marble and stone into monuments, statuary, and for building purposes. The capital is \$50,000 and the incorporators are B. T. Greene, E. R. Grignon and L. F. Berger.

The Farmers Co-operative Phosphate and Fertilizer Co., Mulberry, Fla., has been incorporated under the laws of the state of Florida, to mine phosphate rock. The officers are L. N. Pipkin, president; C. M. Clayton and A. C. Hook, vice-presidents, and J. J. Swearingen, secretary. The capital is \$5,000,000.

Cement

Hanover Portland Cement Co., Hanover, Ont., plans to equip a quarry at a cost of \$200,000.

The T. L. Smith Co., Milwaukee, Wis., has increased its stock from \$800,000 to \$1,250,000; manufacturers of concrete mixing machinery.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., has shut down its plant in order to repair the coal room machinery and several mills in the cement grinding department.

The Bath Portland Cement Co., Bath, Pa., and the Nazareth Cement Co., Nazareth, Pa., have joined in organizing a traffic bureau, with offices at Bethlehem, Pa., to take charge of shipment, rates, and other railroad business.

The Acme Cement Corporation, Catskill, N. Y., which has been closed since shortly after the outbreak of war with Germany, will resume operation about March 1. A force of about 30 men is employed getting the plant ready to resume operation again.

The Dixie Portland Cement Co., Richard City, Tenn., closed its mill recently when its employees asked for an increase in pay and a shortening of working hours. Richard Hardy, president of the company, stated that the company would shut down for the time being in preference to meeting the men's demand.

The Bath Portland Cement Co., Bath, Pa., has purchased property at Sands Eddy, near Easton, Pa., and plans for the erection of new cement mill. At the works at Bath, plans are under way for the erection of a two-story and basement building, 35x53 ft., to cost about \$15,000. The structure will be of brick.

The Standard Portland Cement Co., whose plant is at Leeds, Ala., 18 miles east of Birmingham, has been sold to the Atlas Portland Cement Co. of New York, it is reported. The Leeds plant is one of the most successful cement concerns in this part of the country, and during the present year has been unable to fill all orders for its product. The Atlas company is one of the largest cement manufacturing concerns in the United States, but has no plant in the South; most all of its properties being located in the Lehigh Valley of Pennsylvania. The Atlas Portland Cement Co. has a daily capacity of 50,000 barrels of Atlas cement. This will be added to by the 3,000 barrels capacity of the new subsidiary company.

Lime

The Knickerbocker Lime Co., a large concern of Philadelphia, and having extensive quarries at Exton, Pa., have purchased the Tyson quarries in the Chester Valley, and will in the near future make extensive improvements. These have been the most up-to-date lime kilns in this district. New kilns will be erected on the opposite side of the street and the five old ones will be torn down.

Sand and Gravel

The Wolf River Sand Co., Memphis, Tenn., has just completed extensive improvements and remodeling of their plant and will resume operation very shortly.

The Valley City Stone and Gravel Co., Grand Rapids, Mich., is one of the oldest washed gravel plants in operation, having been in continuous operation for 28 years. Dr. C. M. Kelly is manager of the company.

The Goodwin Gallagher Sand & Gravel Co., Yonkers, N. Y., has received a contract from the Board of Contract and Supply of that city to furnish 1,200 cu. yds. of gravel, which is to be delivered at the city docks. The price is \$1.60 per cu. yd.

The Acme Sand and Gravel Co. will open offices and yards at South West Fifth and Murphy streets, Des Moines, Iowa, about March 1. C. J. Johnson, E. A. Leonard and A. J. Clark are the men forming the new firm. Mr. Johnson was formerly connected with the Chicago, Milwaukee & St. Paul Railroad. He is now associated with the Independent Sand Co. The new company will have a large material capacity.

The State Gravel Co., which has been but recently organized, will open offices at 709 Gravier Street, New Orleans, La. The company is building a new plant near Amite, La., in the vicinity of large sand and gravel deposits. A. D. Alderson, vice-president of the Tioga Gravel Co. of Alexandria, La., is president and general manager of the new company. C. O. Harris of Alexandria is secretary. The offices of the State Gravel Co. will be operated jointly with the Tioga Gravel Co.

The Greenville Stone and Gravel Co., Greenville, Miss., has started up again following a close down of several weeks for repairs. According to W. W. Fisher the company ships from that point on the Mississippi River, large quantities of material for street, road and railway work. The crushed stone plant at Williford, Ark., resumed operation after being closed for several weeks on account of an embargo caused by the coal and car situation. The quarries are extensive and work a number of men.

Geis Botsford, acting for a syndicate of Des Moines, Ia., men, has taken an option on 220 acres of land located on the Des Moines River about 18 miles north of the city, included in which is a proven gravel deposit of 115 acres. The land lies along the river near Madrid, Ia. The deposit has been thoroughly prospected, a total of 149 holes having been put down. The records show a total of over 6,500,000 yards of commercial gravel in the deposit, with a top stripping of less than two feet. Surveys have been completed and plans made for a service railroad track. Parties interested include contractors, who plan to do a considerable business in the construction of the new hard roads provided in the recently adopted state road laws.

Fred Bossert has secured an option on a tract of 51 acres of sand and gravel from the St. Paul Railway Co., located about six miles from Grand Rapids, Wis., on the main line to Cranmoor. The gravel and sand there is stated to be exceptionally good for concrete work, and samples that have been sent to Madison for analysis have been returned with very favorable reports made on them. The pit is located upon three railroads, making shipping facilities especially good. Mr. Bossert states that he has ordered machinery which will be installed for digging and loading the gravel, and that it will be opened in the spring for active work. With the extensive highway work that is contemplated for the next year the sand should find a ready market around the central part of the state.

Quarries

The Cleveland Stone Co., Amherst, Ohio, suffered the loss of the hoisting building from fire.

The Culbert Limestone Plants, Inc., which operates quarries at both Marion, Va., and Grovania, Ga., reports through G. T. Culbert, manager of the Grovania plant, that the property in Georgia has been but recently acquired.

The Thurber Earthen Products Co., which has a capital stock of \$600,000, is building one of the best equipped stone crushing plants in Texas at Ranger. It will have a daily capacity of 1,000 tons. The supply of limestone will last almost indefinitely. The plant contains 4,000 ft. of spur and switch tracks and a series of heavy crushers, the largest of which will be able to handle a piece of stone containing a cu. yd. The Thurber Earthen Products Co. is also contemplating other industries in the vicinity of Ranger.

The Casparis Stone Co., Columbus, Ohio, has amended its articles of incorporation to increase the capital from \$500,000 to \$1,000,000. The increase in capital is necessary to take care of the extensive program of improvements contemplated. Among the improvements will be the acquisition of additional lands adjacent to its property at Marble Cliff, a suburb of Columbus, the erection of a large stone crusher and the installation of other equipment. The plant is one of the largest in the middle west and is expanding rapidly.

The Consolidated Stone and Mining Co., New Castle, Pa., which was organized during November, with a capital stock of \$300,000, is erecting a modern crushing plant of 3,000 cu. yds. capacity. The main breaker is a No. 12 gyratory and the smaller crushers are of suitable size and number to handle the output. The company owns two coal mines and operates a hydrated lime plant with two kilns in connection. The screenings of the stone plant are reduced for agricultural limestone. The property, which consists of 400 acres of coal and stone land, is upon three railroads. Two steam shovels are at present grading for tracks and the plant site. It is expected that operation will start about May 1st.

The Advance Industrial Supply Co., large stone crushing plant at Greentown, on the Gettysburg Division of the Western Maryland Railroad, near Blue Ridge, Pa., was destroyed by fire. The loss is estimated at \$500,000. Nothing was saved except the dynamite house. Three Western Maryland freight cars loaded with company products on the siding were burned. The Advance Industrial Supply Co. is owned by C. S. Wright and Albert Sharpneck, both residents of Chicago. The plant was built ten years ago and has been very successful. The product is grit ground from the hard green copper stone found in that section of the Blue Ridge. It is used exclusively in slag roofing and tile work. It is thought the loss is largely covered by insurance and that the industry will be rebuilt. There are two other plants in that locality owned by Elmer Funkhouser and the Standard Stone Products Co.

Retail Dealers

The Kimballton Lime Co., of Giles County, Ohio, has increased its capital stock from \$25,000 to \$50,000 and will enlarge the capacity of its works.

The Perry Sand and Coal Co., Columbus, Ohio, has been incorporated with a capital of \$10,000. The incorporators are E. A. Wheeler, D. L. Mason, C. G. Kern, E. Kern and O. C. Rush.

The Fuller Goodman Co., Oshkosh, Wis., has changed articles of incorporation to increase the capital stock from \$200,000 to \$400,000. This company deals in retail lumber and building material.

The Woodruff Builders Supply Co., Woodruff, Wis., has been incorporated to deal in cement and all building material. The capital is \$10,000 and the incorporators are C. F. Smith, C. F. Brodock and H. J. Brodock.

The Czerwinski Construction Co., Inc., Milwaukee, Wis., has been incorporated to do general paving, concrete and construction business. The capital is \$10,000 and the incorporators are Josie Czerwinski, Clara Czerwinski, Anna Borst and E. G. Wurster.

The Stoughton Lumber and Supply Co., Stoughton, Wis., has been incorporated under the laws of the state of Wisconsin for the purpose of dealing in wholesale and retail lumber, lime, stucco, cement, stone and tile. The capital is \$50,000 and the incorporators are C. M. Larson, M. G. Mukens and T. T. Horn.

The Texas Building Material Co., Beaumont, Texas, is the successor of the Romayor Gravel Co. and the Texas Rock Co. The capital is \$100,000 and the officers of the new company are: E. A. Fletcher, president; W. E. Sampson, vice-president and general manager and Edward Paggi, secretary and treasurer.

The Douglas-Dickson Co., Johnson City, N. Y., has been incorporated to deal in building materials. The capital is \$25,000 and W. T. Douglas, Binghamton, N. Y., is the incorporator.

Prairie Concrete Products Co., Prairie du Chien, Wis., has been incorporated to deal in concrete and cement products. The capital is \$15,000 and the incorporators are G. J. Lingst, Thomas Wooley and S. V. Taylor.

Reichert Metal Concrete Forms Co., Milwaukee, Wis., has been incorporated to manufacture concrete metal forms, building and construction materials. The capital stock is \$50,000. The incorporators are Martin Kantin, G. M. Reichert and M. H. Umbreit.

Cook Builders' Supply Co., Springfield, Mass., has been incorporated under the laws of Massachusetts for the purpose of dealing in builders' supplies. The capital is \$30,000. The directors are: G. S. Cook, president; W. T. A. Leahy, treasurer, and F. J. Cahill.

The W. E. Martin and Son, Inc., LeClaire, Iowa, has been incorporated to manufacture drain tile, sewer pipe, brick and other clay products, deal in lumber, cement, lime, sand and coal. The capital is \$250,000 and the officers are W. E. Martin, president; C. A. Martin, vice-president; C. W. Martin, secretary, and F. D. Martin, treasurer.

The Elk River Concrete Products Co., Elk River, Minn., has been incorporated for the purpose of manufacturing and dealing in cement products, owning and operating a sand and gravel pit and dealing in the products. The capital stock is \$100,000 and the officers are L. D. Bailey, president; R. C. Longfellow, vice-president, and D. W. Longwell, secretary and treasurer.

The Acme Clay Products Co., Detroit, Mich., has been incorporated under the laws of the state of Michigan to manufacture and deal in fire brick, sewer tile, hollow tile and building material. The capital stock is \$20,000. The incorporators are: D. D. Davis of the Davis Fire Brick Co.; S. P. Reitz of the Cambria Clay Products Co.; Simon Labold of the Carlisle Labold Co. A. J. O'Brien is president and general manager.

Waldo Bros. and Bond, dealers in building material and construction equipment, is the new designation of what were two of the best established contracting firms in Boston, Mass. The merger is the combination of the two businesses, Waldo Brothers, for years the largest dealers in building material in New England, and Harold L. Bond Co., which occupied a similar position in the field of construction equipment. The new firm, which is unique in business affairs of the city in that it is the combination of two powerful business factors and not an absorption by a great firm of a weakling in the same line, will do business from now on at new offices at 181 Congress Street. Waldo Brothers began its existence just 50 years ago. During the period of half a century Waldo Bros. has gradually increased its activities, until today, practically all the materials used in the construction of a building are handled by it. The Harold L. Bond Co. had its beginning in 1900 at 140 Pearl St. In 1903 the company was incorporated with a capital of \$10,000. From that time until 1910, when business necessitated larger quarters and the business was moved to the store at 383-391 Atlantic Ave., the history of the firm has been one of steady and natural growth. Both companies are entering new phases of their respective careers, combining resources and experience with a subsequent economy in operating expenses because of the sameness of the lines of work. The officers and directors of Waldo Brothers and Bond Co. are Harold L. Bond, president; C. Sidney Waldo, first vice-president; Lewellyn Howland, vice-president; Harold C. Bond, secretary; James G. Lincoln, treasurer; Fred W. Mattheis, sales manager; and Roger Ernst and Frank M. Bates.

Manufacturers

The Fate-Root-Heath Co., Plymouth, Ohio, which manufactures, among other things, the Plymouth gasoline locomotive, has necessitated because of expansion of the million dollar plant at Plymouth, the building of a number of homes for the incoming workmen. At a meeting of the Commerce Club, \$31,000 was raised in 30 minutes in this town of 1,500 inhabitants.

The Portable Machinery Co., Passaic, N. J., has ready for circulation, literature and price lists covering the Scoop Conveyor, which is manufactured in six different sizes. The Scoop Conveyor seems to be particularly adapted to loading wagons and cars from stock piles of sand, gravel, stone, etc. The six types give a wide latitude as to the material handled; each type being more particularly designed to handle one class of material. The literature ready for circulation gives a good idea of these different conveyors in operation.

The Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has just issued their bulletin No. 120 which will be of interest to the stone, sand and gravel producers. This bulletin outlines repair parts for the quarry and crushing machinery.

The F. L. Smith and Co., Engineers, 50 Church Street, New York City, is circulating pamphlets on the washmill, and correcting basin. In portland cement plants operated by the wet process the washmill is used to prepare the materials either for the preliminary grinders or the finishing grinders, as may be required. The washmill is designed for the manipulation of a soft material with water to form a slurry. The correcting basin is also used in wet process cement plants. With its use, the F. L. Smith Co. claim that the (CaCO₃) lime content may be easily and continuously controlled within one-half of one per cent.

A contract recently signed between the Fairbanks Co. of New York City and the Lincoln Electric Co. of Cleveland, Ohio, gives the Fairbanks Co. the exclusive distribution of Lincoln electric motors for industrial applications. This line includes alternating current motors for two and three-phase circuits in capacities from one-half to 500 h.p., for all commercial voltages and frequencies, and direct current motors from one-half to 150 h.p. The Fairbanks Co. will also co-operate with the various Lincoln district offices in connection with the sale of the manufacturer's other products. The Lincoln Electric Co. is the third largest manufacturer of industrial electric motors in this country.

The Worthington Pump and Machinery Corp., whose main offices are in New York City, has ready for circulation a new and complete bulletin on "Condensing Apparatus." The many illustrations, explanations, and much convincing data contained in the 115 pages give this booklet the standing of a standard text book on Condensing and Auxiliary machinery. The Worthington company is a manufacturer of every type of jet, barometric and surface condenser and auxiliaries for low and high vacuum apparatus. This booklet contains illustration, complete description as to construction and theory of operation of each type. The tables and curves included would be of particular aid in the solution of condensing problems. Each subject is discussed in a separate department and indexed so that it is easy to find.

The Traylor Engineering and Manufacturing Co., main offices and works at Allentown, Pa., has just published Bulletin CX-1 on Bulldog gyratory crushers. This 32-page booklet is a very complete treatise on the construction of the Bulldog gyratory crusher, and besides showing an assembled drawing of a gyratory, it also illustrates and describes each part in a manner which is very simple and comprehensive. Tables showing the performance of each crusher as to capacity, initial opening, setting, speed, weight and horsepower requirements are included. The bulletin also includes continuous elevator buckets, revolving stone screens, fiction hoists, heavy duty crushing rolls, bulldog jaw crushers and bulldog feeders. The subjects are presented in an attractive manner and the bulletin is very interesting.

The Sullivan Machinery Co., Chicago, Ill., makes the following announcements: The appointment of Arthur E. Blackwood, hitherto manager of its branch office in New York City, as vice-president, in charge of finance and accounting, with headquarters at Chicago. Louis R. Chadwick, for a number of years manager of the company's office at Spokane, Wash., has been appointed manager at New York City, 30 Church Street, succeeding Mr. Blackwood. Robert T. Banks, for several years associated with this company as sales engineer at its El Paso, Texas, office, has been appointed manager at Spokane to succeed Mr. Chadwick. Howard T. Walsh has been appointed vice-president, in charge of sales; Gilbert K. Wilson, as assistant secretary, in charge of cost accounting; Nathaniel H. Blatchford, Jr., as assistant treasurer; Emil A. Krevis, as general auditor, and Frederick W. Copeland, as manager of foreign sales.

The Link-Belt Co. of Philadelphia and Chicago, manufacturers of all kinds of elevators, hoists, conveyors, conveying equipment, etc., has ready for circulation two very complete bulletins: Book No. 375 and Book No. 380. Book No. 380, which contains 100 pages of illustrations and text, presents the Link-Belt Electric Hoists and Overhead Cranes. The leading features claimed for the hoist are that it requires small head room, the working parts are incased in dust-proof construction, yet parts are easily accessible, automatic lubrication is provided, etc. Considerable space in this book is devoted to Mono-rail trackwork for electric hoists, electric telfers, overhead traveling cranes, and revolving locomotive cranes. This book is very complete, interesting and instructive and to those interested in such machinery would prove to be valuable. Book No. 375 is devoted to elevators and conveyors. The Link-Belt Co.'s wide experience in designing mechanical apparatus for all classes of manufactured and raw products is fully illustrated and described in the 108 pages.

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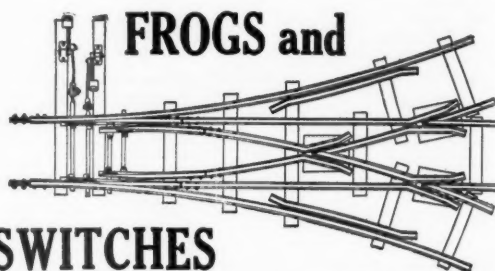
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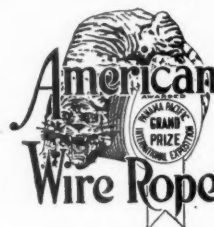
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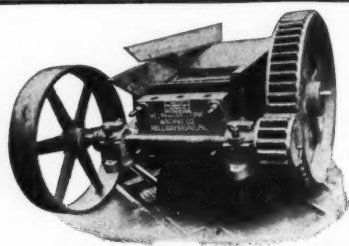


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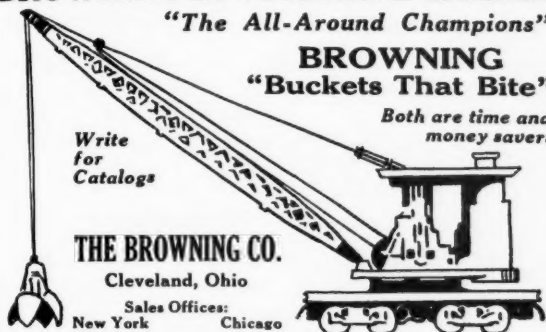
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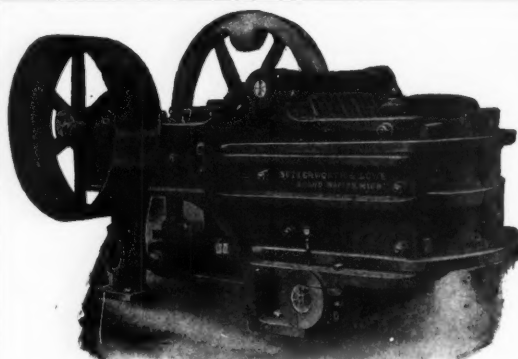
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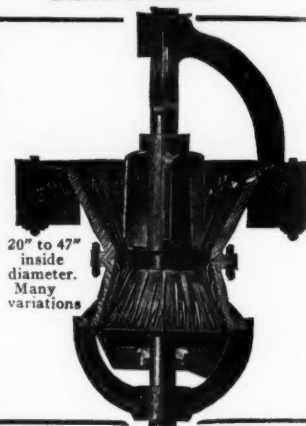
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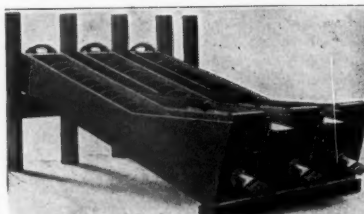
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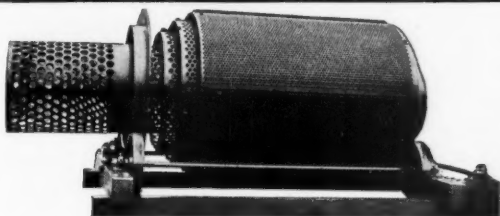
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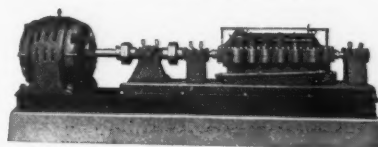
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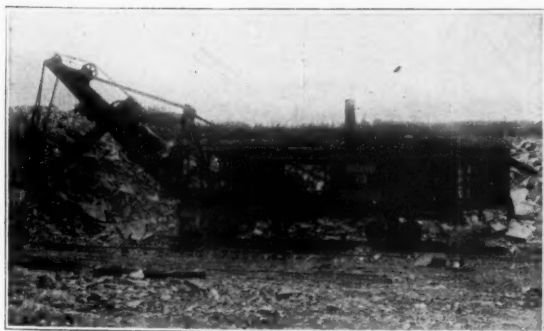
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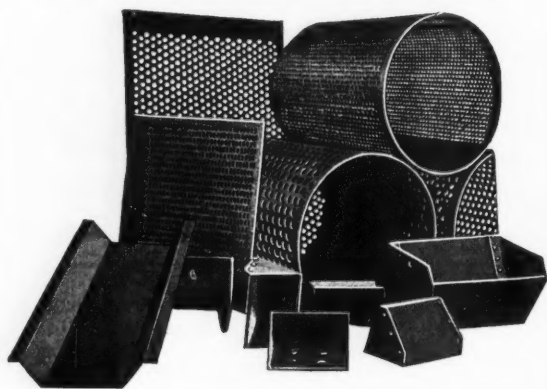
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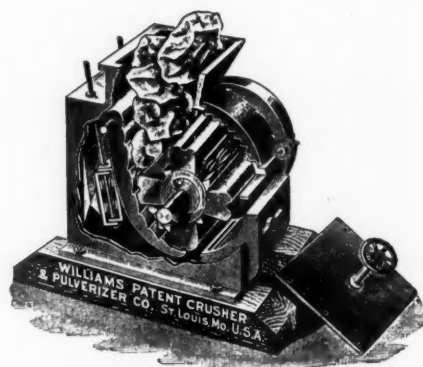
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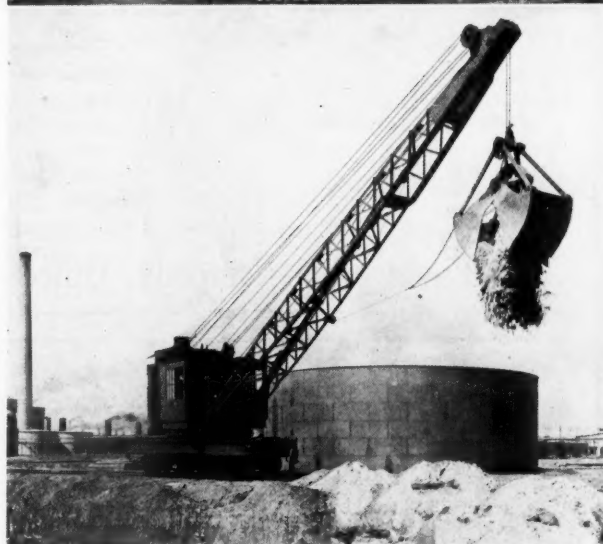
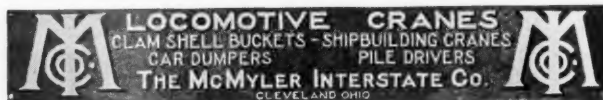
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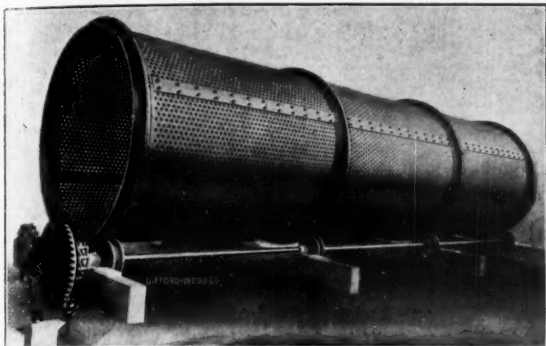
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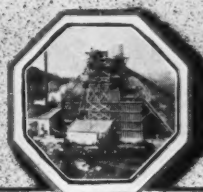
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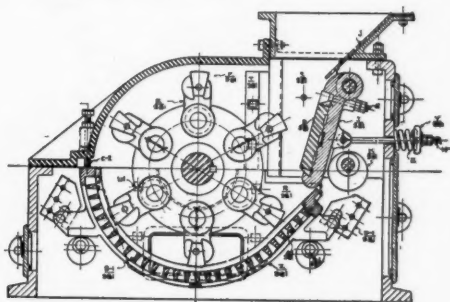
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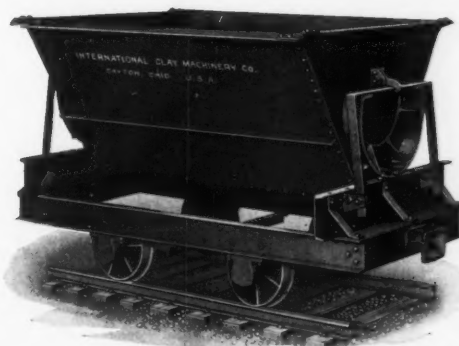
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Industrial Cars OF ALL TYPES

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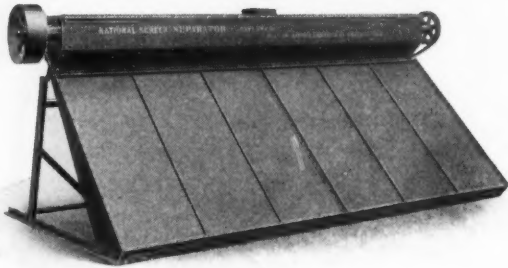
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It's a 20-Ton, 8-Wheel

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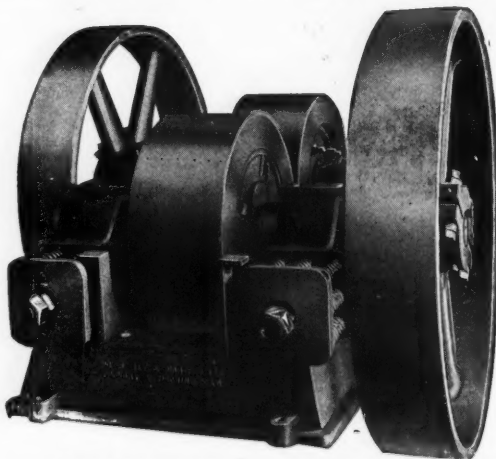


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Points of superior merit guar-
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**Pulverizer
Mill**

They are unequalled for pro-
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Agricultural Limestone

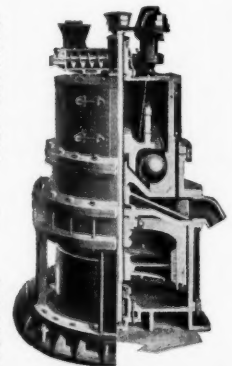
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product. No inside journals or bearings.
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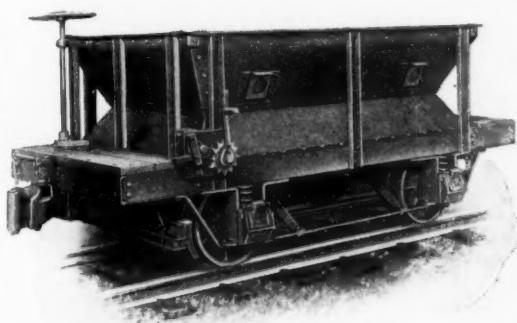
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CARS—every type—that's all we make.

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**"Now use
500 lbs. less
coal, and only
one man"**

"We are delighted with our ERIE Shovel. It digs daily 350 cu. yds. of sand and gravel, with one man both operating and firing; and using about 500 lbs. of coal."

"To do the same work last year with our previous shovel, we needed one more man and twice the coal."

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We will be glad to send you a bulletin showing just what the ERIE can do. Write for Bulletin P.

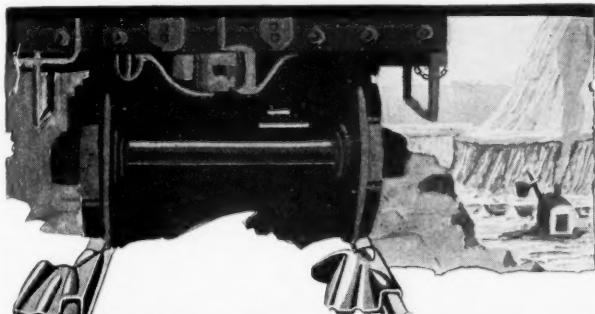


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Cut the Cost of Replacement Delays!

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BEAUMONT ROCK CRUSHERS

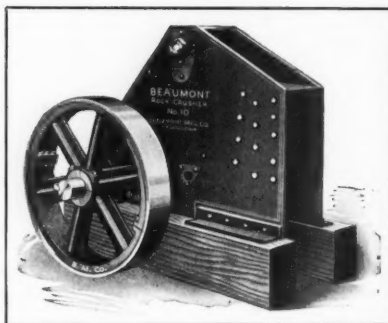
Rugged

They are built of Plate Steel for heavy service.

A minimum of weight is thus assured with maximum strength. For hard crushing, a Beaumont meets the most exacting demands.

Durable

Wearing Plates are of high carbon steel, bolted on inside of crusher, one on each side of opening, and are reversible four times. Swinging jaw of cast steel weighing approximately 1350 pounds. This jaw has a replaceable bushing on fulcrum shaft.



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Beaumont Crushers are designed mechanically correct, and lost motion is practically eliminated. Few parts as possible insure maximum simplicity of operation. They give the same number of jaw strokes at half the cam shaft speed.

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We make no extravagant claim when we say that a Beaumont Crusher will produce as much, and in all probability more stone, size for size, than any other crusher made. Being made of Plate Steel, they weigh less and are ideal Crushers for exporting. The parts are designed so that they can be shipped within customary limitations.

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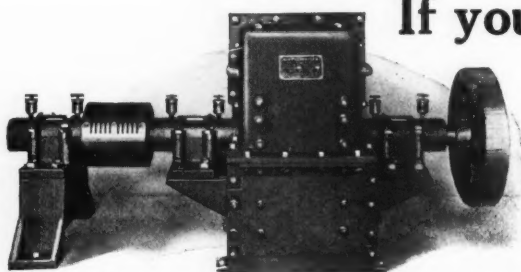
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is doing for others in cutting down running expenses by using less power, let us send you figures on what you want to crush.

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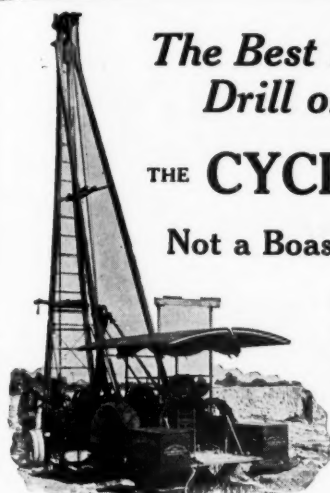
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If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

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A typical VULCAN record

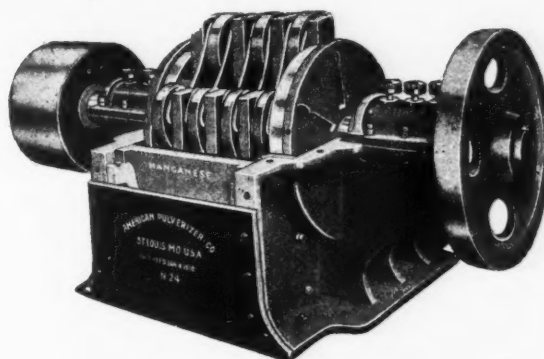


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Locomotive Designers and Builders
1753 Main Street
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Increase Your Production

The tremendous demand for Lime Stone Fertilizer in 1920 provides a profitable market for all that you can produce. To obtain and maintain maximum production at the lowest cost install



The Patented **AMERICAN RING PULVERIZER**

Note These Points of Superiority:

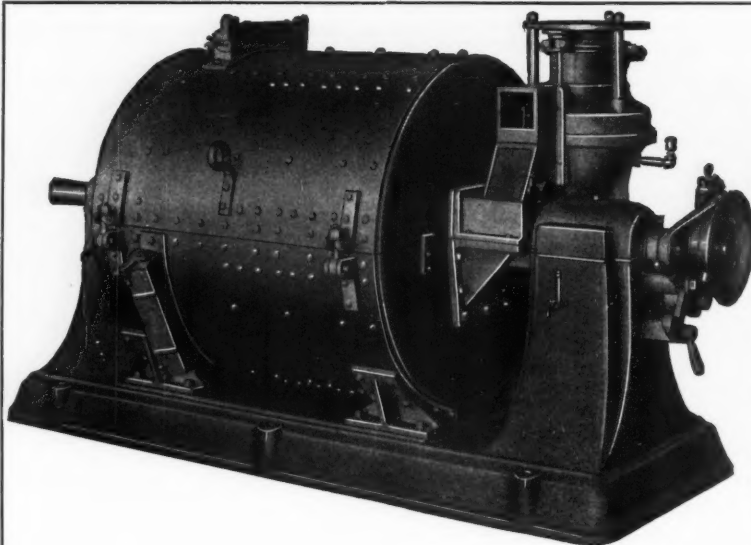
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- 6th—Ease of Operation and Care.
- 7th—No Lost Time.
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The AERO makes practicable the highest efficiency obtainable from coal. It makes it burn like a gas, producing at will a wide range of temperatures, a flame, the physical and chemical character of which is regulable — one that may be elongated or shortened, made oxidizing, reducing or neutral, as occasion may require.

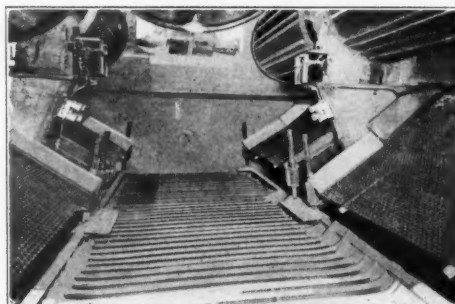
Each pulverizer is primarily intended to operate as a unit with a single furnace. The AERO is built in five standard sizes, ranging in capacity from 600 to 5,000 lbs. of coal per hour.

Backed by the Longest Successful Service of Any Pulverized Coal Equipment

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Eight Mitchell Electric Vibrating Screens

return more than 12,000
tons of minus 1/2" material
daily on 3 H.P.



For eight screens, even with a large power consumption, to deliver 12,000 tons of minus 1/2" material in 24 hours, thoroughly screened, is a remarkable achievement in screening.

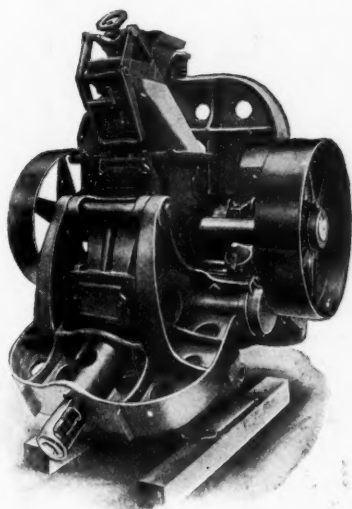
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If you are looking for an opportunity to increase your screening tonnage and at the same time its thoroughness, with a great reduction in operating expense, send for our booklet on the Mitchell Electric Vibrating Screen.

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The UNIT that has LARGER
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UNEXCELLED for packing pulverized limestone,
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Reduction in the cost of filling bags—that's what
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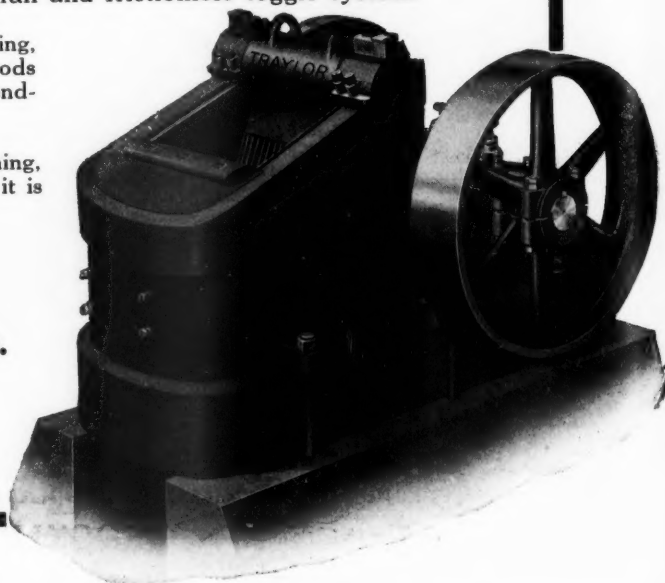
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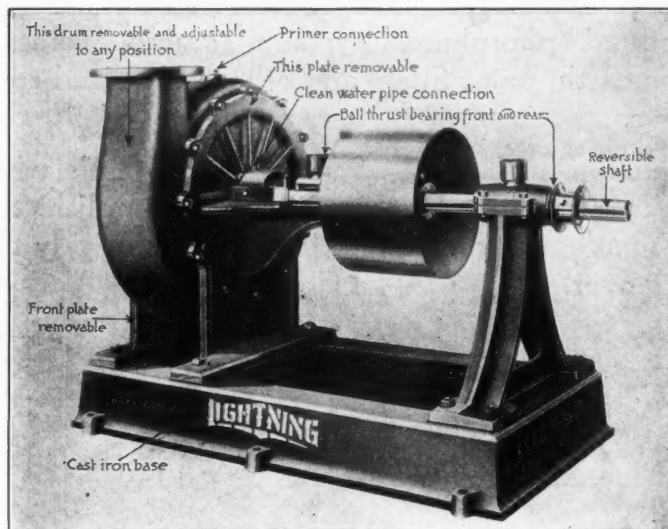
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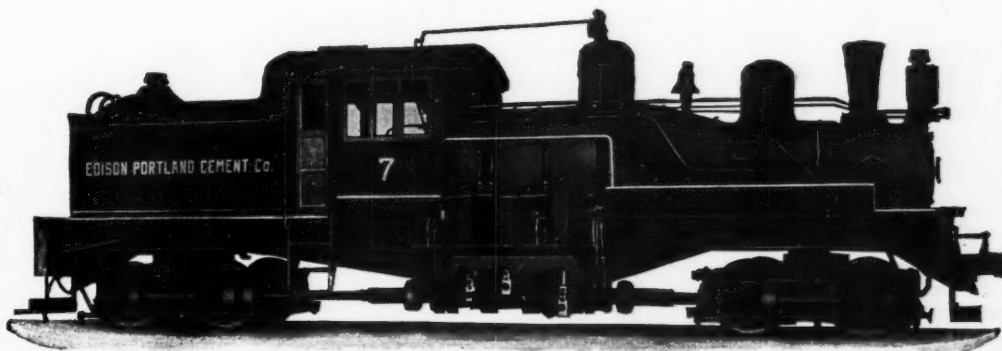
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The Shay is the most powerful kind of motive power you can use for quarry work.

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AUTOMATIC operation delivers lime by **weight**, not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

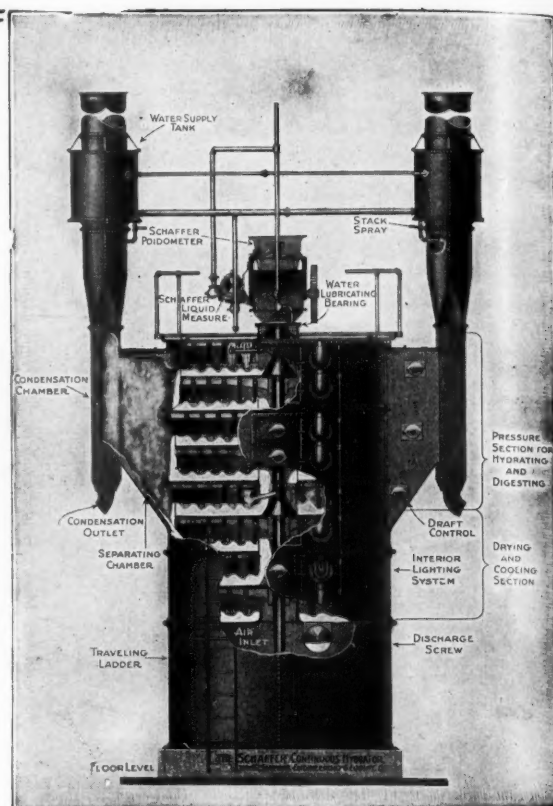
The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

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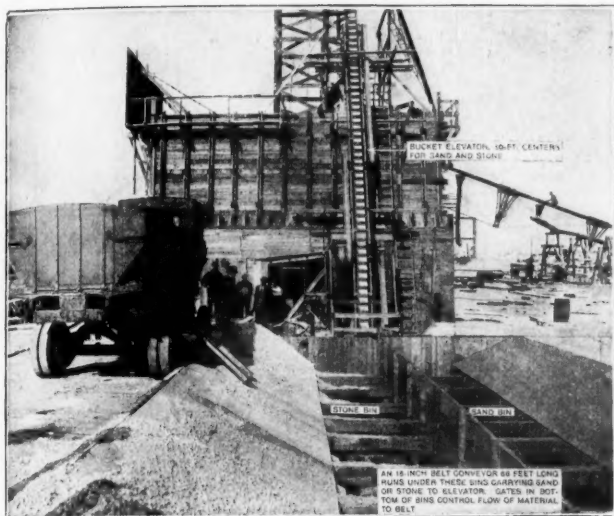
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The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate, and most economical in cost of installing, maintaining and operating.

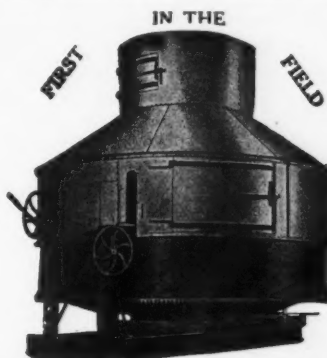
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FIRE BRICK

Robinson Clay Product Co., The, Akron, Ohio.

FUSES

Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS

Chapman Eng. Co., Mt. Vernon, Ohio.
International Clay Mach. Co., Dayton, Ohio.

GEARS

Caldwell, H. W. & Son Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

GLASS SAND EQUIPMENT

Lewistown Fdy. & Mach. Co., Lewistown, Pa.

HOISTS

American Hoist & Derrick Co., St. Paul, Minn.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Vulcan Iron Works, Wilkes-Barre, Pa.

HOSE

Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, O.
Goodyear Tire & Rubber Co., Akron, O.
N. Y. Belting & Packing Co., New York City.

HYDRATING MACHINERY

Atlas Car & Mfg. Co., Cleveland, Ohio.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

HYDRAULIC DREDGES

Morris Machine Works, Baldwinville, N. Y.

INDUSTRIAL CARS

Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
International Clay Machine Co., Dayton, Ohio.
Watt Mining Car Wheel Co., Barnesville, Ohio.

LIME KILNS

Arnold & Weigel, Woodville, Ohio.
Stacey-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS

Ball Engine Co., Erie, Pa.
Gifford-Wood Co., Hudson, N. Y.
International Clay Mach. Co., Dayton, O.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

LOCOMOTIVES

Baldwin Locomotive Works, The, Philadelphia, Pa.
Pate-Root-Heath Co., Plymouth, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York City.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitecomb Co., Geo. D., Rochelle, Ill.

MANGANESE STEEL

American Mang. Steel Co., Chicago, Ill.

MOTORS, ELECTRIC

Gifford-Wood Co., Hudson, N. Y.

MOTOR TRUCKS

Duplex Truck Co., Lansing, Mich.
Federal Motor Truck Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.

PACKING

Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber Mfg. Co., Cincinnati, O.
Goodyear Tire & Rubber Co., Akron, O.
N. Y. Belting & Packing Co., New York City.

PAINT AND COATINGS

Williams, C. K., & Co., Easton, Pa.

PERFORATED METALS

Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Johnston & Chapman Co., Chicago, Ill.
Nortmann Duffke Co., Milwaukee, Wis.

PLASTER MACHINERY

Butterworth & Lowe, Grand Rapids, Mich.
Ehram & Sons Co., J. B., Enterprise, Kan.

PORTABLE CONVEYORS

Stephens-Adamson Mfg. Co., Aurora, Ill.

PORTABLE STONE BINS

Austin Mfg. Co., Chicago, Ill.

PUMPS

American Well Works, Aurora, Ill.
Worthington Pump & Machine Co., N. Y. City.

PUMPS, SAND

American Manganese Steel Co., Chicago, Ill.
K. C. Hay Press & Tractor Co., Kansas City, Mo.
Morris Mach. Works, Baldwinville, N. Y.

POWER TRANSMITTING MACHINERY

Caldwell, H. W. & Son Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Weller Mfg. Co., Chicago, Ill.

POWDER

Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.

PULVERIZED FUEL EQUIPMENT

Aero Pulv. Co., New York City.
Bradley Pulv. Co., Allentown, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

QUARRY EQUIPMENT

Beaumont Mfg. Co., Philadelphia, Pa.
Marion Steam Shovel Co., Marion, O.
Universal Road Mach. Co., Kingston, N. Y.

SCRAPERS, DRAG

Sauerman Bros., Chicago, Ill.

SCREENS

Audubon Wire Cloth Co., Audubon, N. J.
Austin Mfg. Co., Chicago, Ill.
Beaumont Mfg. Co., Philadelphia, Pa.
Cross Eng. Co., Carbondale, Pa.
Gifford-Wood Co., Hudson, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Johnston & Chapman Co., Chicago, Ill.
National Engineering Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Stimpson Equip. Co., Salt Lake City, Utah.
Sturtevant Mill Co., Boston, Mass.
Toepfer & Sons Co., W., Milwaukee, Wis.
Universal Road Mach. Co., Kingston, N. Y.

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Sturtevant Mill Co., Boston, Mass.

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SEWER PIPE

Robinson Clay Product Co., The, Akron, Ohio.

SHEAVES

Mayer-Hasseldiek Mfg. Co., St. Louis, Mo.

SHOVELS

Steam and Electric

Ball Engine Co., Erie, Pa.
Bucyrus Company, Milwaukee, Wis.
Marion Steam Shovel Co., Marion, Ohio.
The Osgood Co., Marion, Ohio.
Victor R. Browning & Co., Cleveland, Ohio.

STONE ELEVATORS

Austin Mfg. Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Weller Mfg. Co., Chicago, Ill.

TANK CRAWLERS

Victor R. Browning & Co., Cleveland, Ohio.

TRACK EQUIPMENT

Central Switch & Frog Co., Cincinnati, Ohio.
Track Equipment Co., Huntington, W. Va.

VALVES

Goodyear Tire & Rubber Co., Akron, O.

WASHERS, GRAVEL

Smith Eng. Works, Milwaukee, Wis.

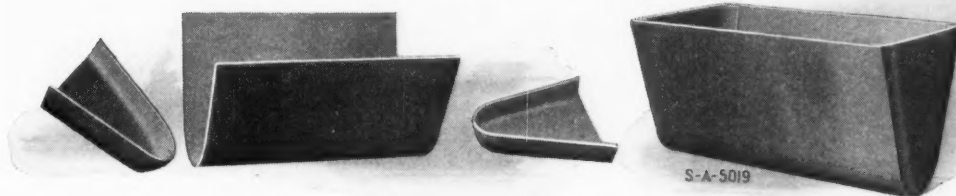
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American Steel & Wire Co., Chicago, Ill.
Leach, A. & Sons Co., St. Louis, Mo.
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Waterbury Co., New York City.

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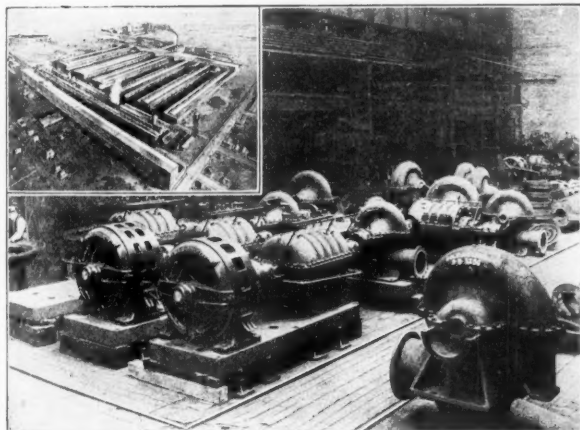


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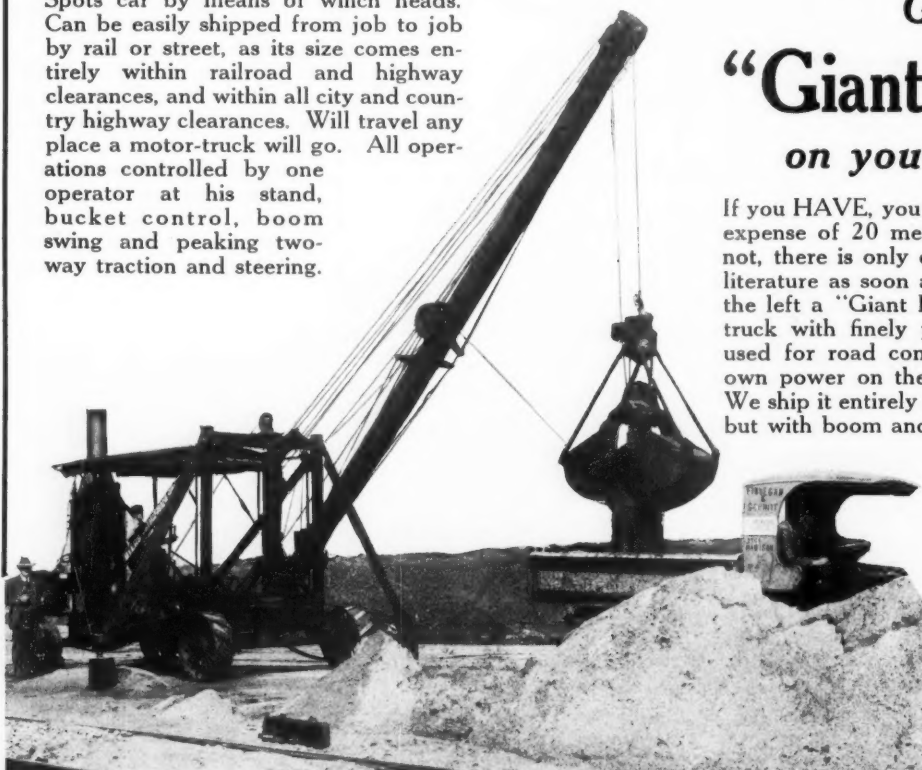
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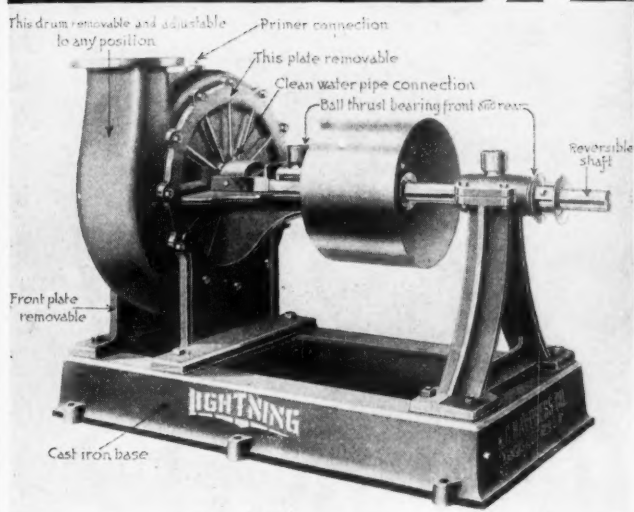
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